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EDITORIAL NOTES.

The Calorific Value Standard to Supersede the Illuminating Power Standard.

THE death-blow to the illuminating power standard has been given; and a calorific standard has been set up, with conditions attaching slightly more stringent than those which the gas industry had almost accepted, and would have preferred to accept, as the model ones. However, the new conditions (other than where variation is desirable in the matter of the number of B.Th.U. constituting the standard) are such that they may be agreed to, and adopted by, gas undertakings generally when promoting Bills. The decision has been arrived at on what has been generally agreed by those interested in the promotions of this session should be the "test case"—that is, on the Gas Light and Coke Company's Bill, which proposed relief for the Company from dual penalty testing by the cancelling of the illuminating power standard and test, and asked for the modification, with the view to securing uniformity in terminology and conditions, of the Company's existing calorific value standard and test. In view of this being in the nature of a test case, the decision that has been come to by Lord Clinton's Committee is one which virtually constitutes a fresh epoch in the history of gas supply; for we do not think that those who were responsible for forcing a contest over the Company's proposals will seek further modification of the conditions in the House of Commons (although all their representatives declined to appear on clauses), in face of a report by the Board of Trade, the evidence of an independent witness such as Professor Boys (one of the Metropolitan Gas Referees), the evidence given by Professor Vivian B. Lewes on behalf of the City of London Corporation, the letter that appears in our "Correspondence" columns from Mr. J. G. Newbigging (the technical witness for the London County Council), and the very patient consideration given by the Lords Committee to all that the opposition could advance before giving their verdict. To say the least, it was an invertebrate sort of opposition; and though there were several bodies opposing, they had but a single case, and were early in the proceedings obviously and uneasily conscious that their position was a weak and untenable one, and that their case, taken as a whole, was as loosely composed as it well could be. On nearly all points they were brought, by their own evidence, nearer and nearer to the Company's position; and ultimately they found themselves almost impotent in arguing for anything but a tightening of the terms on which a calorific value test should be granted.

Of course, all the artifices were employed that the combined wisdom of the opposition could bring to bear on the matter. They pleaded for that ignorant and wasteful person who is so unmindful of his own interests as to be a flat-flame burner user. They also went so far as to insinuate that a company whose interest it is to supply consumers with the quality of gas best suited for the purposes to which it is applied might, if not legislatively restrained, be so foolish as to go blindly to work to jeopardize those interests. The suggestion was repudiated by Sir Corbet Woodall and Mr. Thomas Goulden, who were not indignant, but were rather amused at the folly which prompted such an argument. The stupidity of the insinuation was more apparent to Lord Clinton than to those who advanced it; for he pointed out that the history of the Company was entirely contrary to the suggestions that they would work down to the minimum points in the standard, or debase the gas so that it would be valueless. At every turn the opposition came up against a sheer stone wall. The County Council made a sorry mess of trying to explain away why they had agreed (three years after the dual test was placed upon the Gas Light Company) to the abrogation of the illuminating power standard and test in the case of the Wandsworth Company, and had themselves urged in the case of the South Suburban Company the displacement of the illuminating power test and the setting up of a calorific value standard and test on the very terms now sought by the Gas Light and Coke Company, one result of which change was that Mr. H. E. Jones and Mr. Charles Hunt, the respective Chairmen of the two Companies, were able to come forward and say that there had been no complaint from the consumers of any degradation of the gas supply in respect of its luminous value. One witness for the County Council thought that the increased make of gas per ton of coal carbonized showed what had happened in the case of these two Companies as the result of the change effected in standard and test; and obviously the point was made for the purpose of getting some immediate concession for the consumer, other than his well-protected due under the sliding-scale. Fortunately for the witness, he confessed that he was not a technical gas man, which confession protects him from the criticism that he deserves on the score of his lack of knowledge as to improved makes resulting from modern coal-carbonizing practices. He can, if he chooses to make a calculation, find the same thing in the case of the South Metropolitan Gas Company, and many other concerns—Manchester, for example, where there has been no change of recent times in the level of quality worked to, although the Gas Department are free from statutory control in this respect. However, we do not think it is worth while wasting time and space in further comment here on the case for the opposition.

Let us come at once to the terms of the decision given. The Committee disestablished penal testing for illuminating power. They could hardly have done otherwise after the Board of Trade report, the statement by Professor Boys, and other evidence as to the whole practice being obsolete, in view of the facts that 90 to 95 per cent. of the gas consumed is used only for its heating value, while the bulk of the remainder is employed by negligent people, and generally in places where a small light is only occasionally required, and that the argand standard burner is not an instrument that is used by the general consumer. But the Committee have conceded to the opposition—for what it is worth—the continuance of flat-flame testing for information only, without a penalty. What advantage this will be to anybody is not easily seen, and no one need disturb himself in trying to find out. We doubt, too, whether the testing authorities themselves will trouble to carry out tests, notwithstanding that Parliament gives them the right to do so. The only trouble is that someone will be under the obligation to keep the necessary testing apparatus going for a purpose destitute of any intrinsic merit. As to the calorific power test, the Company have secured the standard for which they asked—540 B.Th.U. gross; but where they have lost has been on the margin separating the standard from the penal level, and on the protecting average of, in the event of a lapse in the calorific quality, the results of three days' testing. In the case of precedents of recent sessions—the South Suburban Company's being the one followed by that of the Gas Light and Coke Company—there has been an allowance made of 12½ per cent. from the standard before visions of penalty could arise; but the decision just given reduces this allowance to 7½ per cent., which draws the line between penalty and safety at 499·5—say, 500 B.Th.U. The average of three days' tests in the case of a lapse has also been disallowed; and the average of two tests in one day will now have to suffice. These terms are admittedly losses; and it hardly seems fair that the Committee should have reduced the margin between standard and penalty line, and at the same time have curtailed the period over which the average could be calculated. However, those who were in effect the advisers of the Committee—the Board of Trade and Professor Boys—thought the proper thing for the dignity of a standard of quality would be to set one with which there could be compliance on the part of the undertaking concerned, with a small percentage allowance for emergencies; and then let the gas suppliers work to what margin they pleased above

the more definite standard. Sir Corbet Woodall quite fell in with this idea, and was willing to take a standard of 510 B.Th.U. gross, with a 5 per cent. margin. But the Committee preferred making the figure 540 B.Th.U. gross, with a 7½ per cent. allowance, so as to ensure the supply of a gas of 500 B.Th.U. gross.

Comparing this with the Company's old calorific standard (which was accompanied by a 14-candle standard for illuminating power), and converting the calories to B.Th.U., the deposed standard was 551½ B.Th.U.; the figure at or above which no penalty applied was 495 B.Th.U.; and the minimum test below which the Company were not entitled to three days' average was 468 B.Th.U. The nominal standard has therefore been reduced by 11½ B.Th.U. But the Company have lost 3½ B.Th.U. on the figure at or above which no penalty is incurred, and in this respect they are 4½ per cent. worse off than the South Suburban Company. However, the decision about meets the Company's position, seeing that their average for calorific value last year was 540 B.Th.U., and the minimum 502 B.Th.U.

As to the future, there is no doubt that a model clause will be instituted before next session on the lines of this decision, and probably in accordance with the advice of the Board of Trade. We are glad to see that the Board realize and advise that, while conditions as to terminology —"B.Th.U. gross" especially—may be fixed for all cases, together with the allowance between standard and penal line, the standard itself should be a movable, or rather not a universally applied, figure, and should be the subject of decision according to the conditions of each undertaking. This is a point for which we have contended all through, as there are places and cases where economic supply would be best served (in view of the character of the nearest available coals) by a lower standard than 540 B.Th.U.

On the whole, we are not at all dissatisfied with the decision of Lord Clinton's Committee, though we should have preferred to have seen the less stringent precedent conditions permanently installed, or rather till (if ever) fresh conditions arose that claimed further revision.

Compensation for Municipal Administration.

We have always admired the practical and sometimes original point of view taken by Mr. Harold E. Bloor, of York, when dealing with the affairs of the gas industry. But in the paper that he read before the Northern District Conference of the British Commercial Gas Association last Friday at Newcastle, he endeavoured to handle a subject, and to find a solution to a problem, over which many keen-brained men have failed; and we do not think that Mr. Bloor, ingenious as is his proposal, has produced anything that will triumph in the municipal administration of the gas industry. What Mr. Bloor has been trying to ascertain is how, in some corporeal manner, the ratepayer can be rewarded for his administration of such a trading undertaking as gas supply, and for bearing the not particularly notable responsibility of the financial obligation incurred in respect of capital. Mr. Bloor would launch us upon an illimitable sea of controversy if we carefully proceeded to argue upon premises, conclusions, and so forth as to the correctness of the submission that, for their duties and obligations in connection with gas supply, the ratepayers should be rewarded in some other manner than by the provision of the cheapest and most efficient gas service to the community as a whole. Definitely stated, Mr. Bloor submits: "In order to ensure "proper enterprise in the adoption of economical systems "of manufacture, and the most profitable commercial "methods, it is essential to provide some inducement to "continued effort on the part of the undertakers." He adds that "it is unnecessary to defend this conclusion, for "it has been approved by Parliament in passing the Act of "every sliding-scale company." A further submission is: "To permit the use of gas profits in aid of the rates in pro-"portion to the efficiency of service rendered seems the sole "available means of procuring the proper attention of the "representative of the ratepayer to the interests of the gas "consumer."

In the first place, there is no analogy whatever between the conditions of a sliding-scale gas company and those of a municipally governed concern. The ratepayers do not as a body (like the shareholders of a gas company) provide capital, and their obligations are of a very congenial order; seeing that, if a municipal gas undertaking should ever fail to meet its capital charges, to pay its sometimes more than fair proportion of rates and taxes, and (in most cases) to make a contribution in aid of the rates, the gas consumers are promptly called upon to make up the deficiency. Nor are the ratepayers called upon as a body to manage the affairs of a gas-supply undertaking; and the act of handing over money to the ratepayers as a body, and describing it as remuneration for services rendered, and a stimulant to greater effort, is something that the few public-spirited men who do the actual work will not appreciate. The conditions are all so dissimilar between municipal undertakings and sliding-scale companies, that we fail to see that the recognition of the principle of remuneration for capital provision and services rendered to the public by the latter can in any way be applied to the former. To say to the Kays, the Paxtons, the Duxburys, and others who, helping to administer municipal gas concerns, have fought hard to be relieved of the incubus of profit appropriation, that they require "some "inducement to continued effort," and that rate appropriation seems "the sole available means of procuring the proper "attention" to the affairs of the gas concern, are suggestions that to them would, we feel sure, border upon an insult. They get no personal advantage more than any other ratepayer from giving efficient administrative services to the gas undertaking; and their ideal of public service would be a poor one indeed if profit appropriation in aid of the rates were the sole method by which they experienced reward for their labours. Ask councillors holding views such as those possessed by the public men already named, what is the best reward and incentive that it is possible for them to receive, and they will reply: "To see the community deriving "a supply of gas at the lowest possible cost to the greater "advantage of the city generally than any amount of appro-"priation of profits to be spent in other directions." That is the proper public spirit.

Mr. Bloor himself admits that gas is an essential public service, administering to the health and comfort of society, and as such should be free of special taxes. Further he suggests that the taxing of gas by excessive contributions to the rates belongs to the same order of proceeding as the deposed tax upon glass windows, and is equally indefensible. These contentions show that while there should, in Mr. Bloor's opinion, be remuneration to those who act as directors—that is to say, the ratepayers (not those who represent them, and do the work, because Mr. Bloor may object to the lowering of the standard of public life and ambition by the payment of even members of Parliament)—it should be on a limited scale. This has been what many other men have suggested in trying to find a *via media* between the scandalous excesses of many profit appropriators and the entire elimination of the system as pleaded for by those who would let economy and efficiency of public service stand before a condition of things that has been so terribly abused in connection with municipal trading. The difficulties of the situation are considerable. Mr. Bloor has found them so, and has not produced any more successful solution of the problem than others who before him have tried their hands at the same thing.

Among the previous proposals there has been the fixed annual appropriation, which has the effect of causing some councillors—we do not suggest those entrusted with the actual administration of a gas undertaking—to say: "Thus "far may we go; the gas concern may therefore now take "care of itself; and we will devote attention to developing "the competing and unfettered business." A percentage on outstanding capital is another method. But, as Mr. Bloor admits, it may be an incentive to keep the outstanding capital as large as possible. Then there is his own proposal. Leading up to it he says that money is borrowed for "municipal gas undertakings on the security of the rates, "and the duties of directors are performed gratuitously." He assumes that for the work of directing the undertaking 1d. per 1000 cubic feet sold is "fully equal to the value "of those services;" and he therefore suggests that such a contribution in aid of the rates should be taken as the standard contribution in all cases. As things go in these days, this would be a remarkably fine compensation for services rendered in the management of many undertakings. The directors of a large number of gas company undertakings would be pleased to have their services acknowledged in so handsome a way. We are going, as the profit-in-aid question has been so long and freely discussed there, to take Manchester as an illustration—Manchester that has been so modest in its computation of the value of its services in managing the gas undertaking for the consumers that, ever

since the year of the incorporation of the works in 1843, it has taken £3,167,175 from the profits in aid of the rates! Now if Mr. Bloor's 1d. per 1000 cubic feet were taken as being "fully equal" to these managerial services, we arrive at this: During the year last dealt with in the Board of Trade returns, the Department sold 5,605,233,000 cubic feet of gas; and 1d. per 1000 cubic feet upon this would represent £23,355. Compared with the largest gas company undertaking in the world, this £23,355 stands out with generous aspect as recompense for the administrative services of an undertaking of the size of that at Manchester. As a matter of fact, Manchester, on a 1¾ per cent. basis on outstanding capital, took £52,000 last year, and are going to take £50,000 this year, which is a proceeding devoid of administrative sense.

However, Mr. Bloor's generosity expands in computing recompense for municipal administration—the gas consumers finding, in addition to that payment, the money for sinking fund, interest, upkeep, rates, and all else. To keep the administrators up to a sense of their public duty—some stimulus, according to Mr. Bloor, being required—he would introduce a sliding-scale, in this form: He would take the price of gas in 1903-4 as a standard; give the administering ratepayers the 1d. per 1000 cubic feet at that price; and then, for every 1d. reduction in price from the standard charge, would allow additional profit appropriation to the extent of ⅕d. per 1000 cubic feet. Thus, when a reduction of 5d. had been made, there would be an appropriation of 2d. per 1000 cubic feet sold to pass over to the rates as compensation for management. The average price of gas in Manchester for ordinary purposes last year was 1s. 11½d.—say 2s. We believe the price of gas was in 1903-4 about 2s. 4d.; so that practically Manchester has reached the point at which, under Mr. Bloor's scheme, it could take 2d. per 1000 cubic feet. This sliding-scale business is a matter at which we have to look prospectively, and see whether, so far as the signs admit of judgment, the result would not be what Mr. Bloor deprecates—an excessive tax upon the consumer. Carbonizing methods and developments in gas manufacture generally are working out well; and they will have more effect upon the bulk of coal carbonized in future than they have had in the past. If Mr. Newbigging ever realizes his ambition of delivering gas to the Manchester consumers at about 1s. per 1000 cubic feet, then, under Mr. Bloor's scheme, using for calculation the 1912-13 sales of gas, Manchester would take about £93,420 a year from the consumers in aid of the rates—that is to say 4d. per 1000 cubic feet. Why should the administrative services to the gas consumers be appraised at any such figure as this? We cannot see. Would it be a tax upon the consumer, or would it not be? It is quite certain, that, if Mr. Bloor's scheme were seriously adopted, Mr. Newbigging could never hope to live to reach the summit of his aspirations in relation to cheap gas. His Committee could not give away so liberally with one hand, and with the other benefit the city with such cheap gas.

But we want, in conclusion, to ask Mr. Bloor just this: Why, if 1d. per 1000 cubic feet is "fully equal to the value "of the services" rendered, he proposes to pass beyond the 1d.? We will in a few words (while not necessarily agreeing as to the fundamental soundness of the proposal) suggest a much easier way of providing all the stimulation that Mr. Bloor thinks is requisite in public service. If 1d. per 1000 cubic feet of gas sold were allowed for reward and stimulation (without a sliding-scale), then the more thousands of cubic feet that are sold, the more pence in aid of the rates; and the way to get more thousands sold, and more pence into the municipal coffers, would be to reduce the price of gas. This idea has about it the merit of simplicity, while safeguarding all interests. Anyway, we do not think Mr. Bloor's arrangement will ever find much favour; for it is clear to us that prospectively it would in reality be an injury, rather than an advantage, in many cases.

Conditions Contributing to Low Ammonia Yield.

BENEATH the selected title of the lecture—"A Problem of "Modern Gas Practice"—delivered by Professor J. W. Cobb (Livesey Professor at the Leeds University), at the meeting of the North of England Gas Managers' Association last Saturday, there is much which will be read with interest on the subject of conditions in carbonization that cause low yields of ammonia, and which is therefore directive to conditions that favour high yields, so far as they are practicable. On the same subject, we shall no doubt hear more when the research work of the present Institution fellow (Mr. Harold Hollings, B.Sc.) is reported upon at Liverpool next month. But what transpires in the present lecture is indicative of the thoroughness with which investigation into practical problems is being carried out at Leeds under the supervision of Professor Cobb. The question of bringing to book higher quantities of the nitrogen of coal in the shape of sulphate of ammonia is one that has lately been very prominent in the literary efforts of Gas Association presidents and writers of papers; but their consideration has been largely confined to the matter of the conservation of ammonia beyond the coal carbonization process rather than directed to what happens inside the retorts in improving the yield of ammonia. This is where Professor Cobb, Dr. Davidson, and others qualified in chemical and physical research come in. The difficulty in connection with this particular subject is so to order our practices in the retort-house that the maxima of all valuable products may be obtained. It cannot, however, be done, as there seems to be an unkind and fatal hostility between these maxima. If we are to get the maximum from the coal in the shape of the gas required for town purposes, and have the coal well carbonized, it is impossible to procure the maximum yield of ammonia. But knowledge of the carbonizing conditions that favour the highest yields and best qualities of everything is of supreme guiding advantage, and the aggregate of this knowledge must result in an improvement in working and profit.

However, Professor Cobb set himself, in the North of England lecture, to explain some of the causes that produce a comparatively low ammonia yield in ordinary carbonization work relatively to the nitrogen content of the coal. As Dr. Davidson stated, in his recent Scottish Junior Association paper, it is well known that different methods of carbonizing produce different results in the yield of ammonia, and that the retort temperature must be neither too low nor too high to give the highest production. This is exactly what Mr. Lewis Thompson Wright found many years ago—long before some of the present-day investigators had started on their life's work. Thus is seen the reason why—decomposition of ammonia, as pointed out by Professor Cobb, increasing rapidly as the temperature rises—it is difficult in these days of high-temperature carbonization to improve much upon the best ammonia results now achieved. But there has been an improvement in the ammonia yield from the same class coals, notwithstanding the use of high carbonizing temperatures, and this is due to the more modern processes of carbonization, in which the retorts are filled, or nearly so, with coal; and Professor Cobb, although he does not specifically mention the point, throws light on the reason for this. This is one of the matters that, under the lecturer's direction, Mr. Hollings has been investigating in the laboratories of the Coal Gas and Fuel Department at the Leeds University. We know that the results of laboratory distillation work oftentimes show great variation, even using the same coals, from larger-scale ordinary working; and Professor Cobb acknowledges this. At the same time, we do think that the present research will be helpful in showing how the old modes of high-temperature carbonization for gas production were degrading to ammonia yield, while the new methods tend to diminish the conditions that had ill-effect.

"There are," says Professor Cobb, "conditions of large-"scale carbonizing practice that tend to destroy ammonia—"such as the influence of red-hot coke, and perhaps the "action of radiant heat." It is upon these two points that the experiments recounted in the lecture have been carried out; and, passing over the descriptive details, we will here extract the experimental results obtained just as they are mentioned by the lecturer. The experiments were carried out in small tubes, and the results were: With minimum heat action 22·5 per cent. of the total nitrogen in the coal was, on the average, secured as ammonia; with an unpacked tube, to ascertain the effect of radiant heat, the percentage of nitrogen obtained as ammonia was reduced to 17·2; and, on passing the gases through red-hot coke before exit, a further reduction to 9·4 per cent. was observed. This illustrates the deteriorating effect upon the ammonia of the passing of the gases through red-hot coke, and subjecting them to radiant heat. But, of course, the relative experimental deterioration here shown cannot be applied generally to the conditions of carbonization on the large scale, which conditions vary so considerably under the different methods.

But the full, or very nearly full, retort working of to-day largely shields the outgoing gases from the action of radiant heat, and also gives the gases much larger opportunity of escaping in fairly considerable volume without having to run through a mass of incandescent coke. Professor Cobb does not say anything about this point; but the 28 to 30 lbs. yield of sulphate of ammonia per ton of coal carbonized to which some gas-works have ascended in recent times, carbonizing the same class coal as formerly, shows that change has been effected (other than the saving of ammonia losses outside the retort-house) in modifying the depreciating temperature conditions and the travel of the gases from the retort charge, which latter is important when it is remembered that "coal is distilled quickly through the ammonia-yielding "range." The speeding-up of ammonia evolution by the coal-liming process is referred to in the lecture, as well as the conditions existing in producer practice. The lecture is a very practical one; and what is also important is that it adds further testimony to what we have before recognized, that Professor Cobb is a practical scientist.

A Word with Directors and Committeemen.

In discussing last week the papers read at the Newport and Redhill conferences held in connection with the British Commercial Gas Association, reference was made to the absentee undertakings in the list of subscribers to the work of that body. The point was specifically raised in the paper read by Mr. George Clarry; and it was also a point in the address by Mr. W. J. Sandeman at the Redhill conference—he stating that, though there was 80 per cent. of the output of gas represented by the subscribers, there were 1000 gas undertakings out of about 1600 that were not subscribers. It is worth inquiring upon whom should be laid the blame for these 1000 absentees, in view of the unanimity that prevails among the subscribers as to the benefit that the Association confers upon the gas industry generally by its operations—visible and invisible. A feature of these conferences is not only the unanimity of opinion as to the value of the work—as expressed by, among others, Alderman Thomas Canning, at Newport, and Mr. W. Lees Stenning, Mr. Edward Allen, Mr. S. Y. Shoubridge, Mr. W. H. Bennett, Mr. J. R. H. Jacobs, and others at the Redhill conference—but the voluntary testimony of directors and committeemen as to the realized benefits. And it is said with a very sincere feeling that there is more gratification on our part over this new development of an industrial interest on the part of directors and committeemen than there is over all that is said at the conferences by the officials of gas undertakings, although, as our reports show, their speeches include some very practical information and experience. We cannot place too high a value upon the work of an Association that has caused these directors and committeemen to take the "imperial" view as to the aims, position, duties, and responsibilities of the industry. It is an excellent thing.

It was at the Newport Conference that Mr. Norton H. Humphrys, speaking on the point as to the absentee undertakings from the list of subscribers to the Association, focussed the truth of the matter when he said that he was inclined to think that, if it rested with the managers of the various undertakings, a great many more of the latter would come into the fold; but the ultimate decision rested with directors and committeemen. We believe Mr. Humphrys is right, and so would appeal to the directors and committeemen of the absentee undertakings to reconsider their position and the character of the work done by the Association, not for individual undertakings, but for the gas industry as a whole. We say it with all respect to those directors and committeemen who are the cause of abstention, that we cannot understand the reason or reasons that have so far kept them from making a complete industrial affair of this work—thus leaving all that is done to the 600 undertakings representing 80 per cent. of the gas sales of the United Kingdom. We hope there are not many myopes among directors and committeemen like the director referred to at the Newport Conference by Mr. Harold W. Woodall. That director welcomed electrical competition because, he said, it would enable his company to refrain from expending capital on the extension of their plant. The duty of gas directors is to develop to the utmost the service of the industry to the communities at large. There is a responsibility here; and it is difficult to imagine any business man refusing to expend capital when he sees profitable business in sight. It is an insane act to relinquish business to a competitor to save capital expenditure. To those directors who hold such extraordinary views there will come a day of reckoning. But the present desire is that all men administering gas undertakings shall become possessed of the new spirit and the broader view that have taken hold of such an imposing part of the industry, and give evidence of that spirit and view by causing their undertakings to become enrolled among those financing work for the good of the industry at large. But let a remark made by Mr. F. W. Goodenough at Redhill be observed. It was to the effect that the Association are not solicitous for new adherents who are not in sympathy with the work, or who have no belief in it. Such men will never become the firm supporters that a cause of the kind requires.

PERSONAL.

Mr. Robert J. Meiklejohn (for many years Assistant to his uncle, the late Mr. Charles Meiklejohn) has been appointed Engineer and Manager of the Rugby Gas Company.

Mr. Bernard F. Smith (son of Mr. F. R. Smith, of the firm of Messrs. Parkinson and Cowan), who was admitted a Student of the Institution of Civil Engineers on March 23, 1909, has passed by examination into the class of Associate Member.

Mr. H. Dickenson, who has been on the staff of the Aldershot Gas, Water, and District Lighting Company, has been appointed junior technical assistant at the Blackpool Gas-Works—a position for which applications were invited in the "Journal."

In their report (which is noticed elsewhere in this issue), the Directors of the Ballarat (Victoria) Gas Company announce the retirement of Mr. W. H. Figgis, who has been in the service of the Company for 53 years, and for the past 34 years has occupied the position of Manager and Secretary. The Board have appointed the Engineer, Mr. S. E. Figgis, General Manager of the Company, and Mr. D. W. Davies Secretary. Mr. S. E. Figgis paid a lengthy visit to this country about a year ago.

On the occasion of his marriage, Mr. J. Cook, the Chief Clerk to the Herne Bay Gas and Electricity Company, was presented by the staff and employees with a handsome music cabinet in polished mahogany, bearing a suitably inscribed plate. Mr. C. V. Bennett (the Engineer and Manager), in making the presentation, remarked that Mr. Cook had been with them for nineteen years, and no one could desire to work with a better man. He wished him every happiness and prosperity in his married life.

It was stated in last week's "Journal" that, on the occasion of his marriage, Mr. C. Valon Bennett, the Engineer and General Manager of the Rochester, Chatham, and Gillingham Gas Company, was the recipient of a handsome silver salver from the Chairman and Directors of the Company, and also an inlaid mahogany clock from the Secretary and staff at the head office of the Company. The staff of the Distribution Department have since manifested the kindly feeling with which they regard Mr. Bennett by presenting him with a silver hot-water jug.

Mr. Reginald Luxon has been appointed Manager of the Launceston Gas Company, and has entered on his duties. For the past thirteen years, Mr. Luxon has been in the employ of the Ilfracombe Gas Company, and recently has been acting as Assistant to Mr. J. Armstrong in the management of the gas-works at Hale. He obtained a first-class certificate in "Gas Engineering" and "Gas Supply" in the City and Guilds of London examination. His colleagues at Ilfracombe presented him last Wednesday with a gold albert; the formal presentation being made by Mr. A. Norman (the Secretary), who, in the name of the staff, wished Mr. Luxon success in his new sphere.

OBITUARY.

The death has occurred of Mr. William Pickup, of Swinton, who for over forty years was employed by the Swinton and Mexborough Gas Board. Some years ago he retired upon a pension. The deceased was 84 years of age. At the funeral the coffin was borne by employees at the gas-works.

Mr. J. P. Ffinch, whose death took place at Ilfracombe last Wednesday at the age of 78, had long been associated as a Director with the Ilfracombe Gas Company, and took an active interest in its affairs. He was a solicitor by profession, and was associated with many public interests in North Devon.

The death has taken place of Mr. John Brownless, of Chorlton, at the age of 84 years. Upon the death of Sir David Dale, deceased was elected Chairman of the Weardale and Darlington Gas Company, but resigned in 1911. He had also been Chairman of the West Hartlepool Gas and Water Company, and at the time of his death was a Director of the Barnard Castle Gas Company.

The death took place on Saturday of Alderman Charles Jennison, the Vice-Chairman of the Manchester Corporation Gas Committee. Deceased, who was in his 80th year, was senior

surviving son of the late Mr. John Jennison, founder and first proprietor of the famous "Belle Vue" Zoological Gardens, Manchester. During his civic life, he rendered valuable services on the Special Ship Canal Committee and on the Gas, Water, and Electricity Committees.

By the death on last Saturday week, aged 61, of Mr. W. O. DANCKWERTS, K.C., a distinguished member of the Bar, whose name has frequently appeared in our columns, has been removed, to the sorrow of his numerous friends. He was in Court only a few days before, and there was apparently nothing to indicate the approach of an illness which was so soon to have a fatal termination. Mr. Danckwerts was the eldest son of Dr. Adolph Victor Danckwerts, of Somerset East, Cape of Good Hope. He was educated at Bedford School and Gill College, Cape Colony, and afterwards at St. Peter's College, Cambridge, of which he was a graduate. He became a student of the Inner Temple in 1875, at the age of twenty-two, and was called to the Bar three years later, when he attached himself to the South-Eastern circuit. He made rapid headway, and soon achieved a great reputation. He held briefs in most of the noteworthy cases affecting the interests with which the "JOURNAL" is identified; they are too numerous to be specified.

Analyses of the Jones Oil Gas.

In the "JOURNAL" for the 24th of February (p. 511), we reproduced from the "American Gas Institute News" some particulars about the improved Jones system of oil gas manufacture. The current number of the same publication contains the substance of a letter from Mr. L. B. Jones giving three analyses of oil gas and also the amount of oil required per 1000 cubic feet of gas made. They will be found below—No. 1 being an analysis of the oil gas made in 1905 in the early days of the development of the process, No. 2 a typical analysis of the gas produced at the present time in San Francisco, and No. 3 a similar analysis of the gas made by the new process as developed at the Metropolitan works in San Francisco.

	No. 1. Per Cent.	No. 2. Per Cent.	No. 3. Per Cent.
CO_2	1·5	3·0	3·6
C_6H_6	0·7	0·7	0·9
C_nH_{2n}	2·9	6·5	4·9
O_2	0·1	0·2	0·2
CO	3·2	7·0	9·4
H_2	61·8	47·0	38·3
CH_4	23·7	30·0	37·8
N_2	6·1	6·3	4·9
Calorific value, B.Th.U. per cubic foot	550	638	686
Oil per 1000 cubic feet, gallons.	9·2	7·3	7·2

On the assumption that the oil used weighs 7·83 lbs. per gallon and contains 85·5 per cent. by weight of carbon, the weight of carbon in the amount of oil used for gas has been calculated in each case, as has also been that of the carbon contained in the gas, and the ratio between the carbon in the oil and that in the gas obtained. The figures are:

	Carbon in Oil Used. Pounds.	Carbon in Gas. Pounds.	Percentage of the Carbon in the Oil found in the Gas.
No. 1	61·59	12·36	20·0
No. 2	48·87	18·61	38·0
No. 3	48·20	21·24	44·0

This shows consistent progress in increasing the percentage of carbon retained in the gas.

Alliance and Dublin Consumers' Gas Company.—Mr. William Newbigging, Assoc.M.Inst.C.E., of Manchester, has been appointed Consulting Engineer of this Company for a period of three years; and Mr. William Cash (Messrs. Cash, Stone, and Co.) has been engaged to examine and report upon the Company's accounts.

Co-Partnership Extensions.—The May issue of the "South Metropolitan Gas Company's Co-Partnership Journal" says: "We chronicle, with great pleasure, the adoption of co-partnership by the Brentwood Gas Company—the fourth British gas company to adopt the principle this year, and the fortieth to follow our example of nearly a quarter-of-a-century ago. It is reported that the Ipswich Gas Company is seriously considering the question; and the Skegness Gas Company has made provision in its Special Act for a co-partnership scheme."

Midland Junior Gas Association.—Next Saturday, by permission of the South Metropolitan Gas Company, the Association will pay their long anticipated visit to the East Greenwich and Old Kent Road works. The party will have a long day, as they are due to arrive at Paddington at 10.40 in the morning; and the return train does not leave until 12.35 a.m. After an early lunch, the members will assemble at the Old Kent Road works, where they will inspect the meter and stove shops, physical laboratories, &c. Then they will go to East Greenwich, where two parties will be made up—one to visit the tar and chemical works, the other the gas-works. Subsequently tea will be provided in the Workmen's Institute. The Association will hold their annual general meeting on the 23rd inst., when Mr. B. F. Botwood, of Birmingham, will read a paper on "High-Pressure Gas Supply and Reinforcement, and Low-Pressure Standardization." The date of the visit to the Stourbridge Gas-Works and Kinver has been altered to June 13.

NOTES FROM WESTMINSTER.

THROUGH pressure of other duties during the first week of Committee sittings succeeding the brief Easter respite from parliamentary work, there falls for notice now the proceedings of the past fortnight; but the review of the principal features shall be accomplished with as much brevity as possible, in order to put readers in possession of the salient points.

The Calorific Power Contest.

Overshadowing all else in interest and importance is the calorific standard contest, which occupied Lord Clinton's Committee from Tuesday morning of last week until midday Thursday. It is out of chronological order to give it first place, but the importance justifies. Let us shortly recapitulate the circumstances leading up to this contest. In 1909, the Gas Light and Coke Company, at the instance of the London County Council, and under protest by the Company over the unfairness of the proposal, accepted, to avoid opposition, a calorific power standard and test (with penalties attaching for default) in addition to the illuminating power standard and test. Since then various undertakings have had their illuminating power standard annulled, and a calorific value one substituted—in the cases of two Companies, the Wandsworth and the South Suburban, again at the instance of the London County Council. These changes occurred three years after the dual test had been imposed on the Gas Light and Coke Company; and therefore it is fair to assume that the Council considered, like most men in the gas industry, that the day had finally set for an illuminating power test. We still think that the Council believe this, but that some external forces—probably electricity-owning Borough Councils—are, with self-interest animating, of contrary opinion, and refuse to acknowledge what is so apparent to other men, that the gas industry has not been immune from change, and that change has rendered the heating property of gas the capital and almost only requirement, save a reasonable purity. The Gas Light and Coke Company, therefore, after five years' experience of the dual testings, asked to be released from their anomalous and solitary position, by the discontinuance of the standard and test for illuminating power, and the enthronement alone of the calorific standard and test on precisely the same lines as the County Council had agreed to in the case of the South Suburban Company, which involved a change in terminology from calories to B.Th.U., and from net to gross value. Several other promoters this session likewise sought a calorific power standard in place of the illuminating power one; and the authorities of the House and the promoters in most instances agreed that the result of the contest over the Gas Light Company's Bill should be applied to them—not necessarily in the matter of the number of B.Th.U. constituting the standard, nor in respect of the penalties to be inflicted for default, but in regard to the general conditions. The importance to the industry of this contest and its result is thus supreme, as the latter will serve as a guide in the testing enactment of immediate years. The Corporation of the City of London, the County Council, and the various authorities in the eastern parts of the Gas Light Company's area were the opponents.

Pro et Contra.

The Governor (Sir Corbet Woodall) and Directors of the Gas Light and Coke Company did their part well in the matter, realizing fully their position, not only so far as their Company's interests were concerned, but as the, in effect, mouthpieces and representatives for the time being of the gas industry. They retained Mr. Balfour Browne, K.C., Mr. Honoratus Lloyd, K.C., Mr. Pitman, and Mr. Jacques Abady. Sir Corbet kept himself free to take the principal part as witness in the case, and bear the brunt of the opposing Counsel's cross-examination. Mr. Thomas Goulden, the Chief Engineer to the Company, also gave evidence; and Mr. H. E. Jones and Mr. Charles Hunt were there to testify to the fact that all the phantoms that the opposition dragged forth from nobody knows where had not been seen, as a result of the abrogation of the illuminating power test, in the districts of the Wandsworth and South Suburban Companies. There was a good backing of other officials of the Company rendering assistance—Mr. D. Milne Watson (the General Manager). Mr. H. Rayner (the Secretary), Mr. F. W. Goodenough, and Mr. J. G. Taplay, the Chief Chemist. Other witnesses were also in reserve, including Mr. H. A. Humphrey, of gas-pump fame. Among those present for interest on this historic occasion were many gas engineers, including Mr. Charles Carpenter, D.Sc., and Mr. Edward Allen, the President of the Institution of Gas Engineers. A heavy line of Counsel graced the opposition side; and Mr. J. G. Newbigging sat at the back of the County Council leader, and Mr. W. R. Herring with Counsel for the Willesden Borough Council. Mr. Newbigging seemed to be very happy whichever side scored a lasting or even temporary point; but Mr. Herring's seat did not appear so comfortable as he could have desired. The time when Mr. Newbigging was most grave was when in the witness chair; but into the chair Mr. Herring did not go. No value would attach to a summary of the case and evidence for the passing from the one standard to the other. It is all so familiar now to the technical men of the industry. This much, however, may be said, that it was a straight and rational case the Company had to present; and the

opposition found a good deal of discomfiture about the replies in cross-examination of Sir Corbet and his supporters. What with the Company's case, a report by the Board of Trade (set out *in extenso* in our report of the proceedings in "Parliamentary Intelligence") and the evidence of Professor Boys (one of the Metropolitan Gas Referees), the opponents found their case collapsing like a house of cards, before they had actually commenced their own. There was an air of unreality about the position they occupied, and they groped about without any material support. They seemed at one time to be contending that no sufficient change had come over the gas industry to justify the abolition of the illuminating power standard; yet one, and they know it, would have to go far to find another industry that has been the subject of so much change as that of gas supply, with something like 90 to 95 per cent. of the gas consumed now employed for its heating virtue, and only 5 to 10 per cent. for its luminous quality. They urged the case of the flat-flame user—the user who ignores economy—as though he was a *persona grata* in the world's affairs. But there was the Board of Trade report, the independent testimony of Professor Boys (who was called by order of the House), and that of Protessor Vivian B. Lewes who was there, as an official of the Corporation of the City of London, to give evidence in support of the opposition case. The Professor said plainly he could not lend his name to the continuance of the illuminating power test; and that he was distinctly in favour of a calorific standard, but of a more definite character than any hitherto imposed. The official witness for the County Council in trying to explain away the reason for asking for the continuance of the illuminating power standard and test in the case of the Gas Light and Coke Company as well as a calorific power test, seeing that the Council had only desired a calorific standard and test in the suburbs of London, said that the "heart" of London was different. In what way was not made transparent by him. In the heart of London, there is a greater amount of electricity used for illuminating purposes than in the suburbs, but an immense quantity of gas is consumed for its heating value alone. The explanation will not stand scrutiny.

A Flat-Flame Test for Information.

All the effort to excite the sympathy of the Committee for a condition that is practically defunct failed. The authorities of the House and the Board of Trade have not allowed the trend of things in the gas industry to escape notice; and Parliament and the Board of Trade are not prepared to put obstacles in the path of progress. The Board suggested that a flat-flame test might be continued for information purposes only; and Professor Boys thought that a simple test of the kind would be ample. He—no one knows it better—told the Committee plainly that the whole method of testing for illuminating power was arbitrary. Sir Corbet Woodall, however, could not see the value of flat-flame testing, even without penalty, being made part of any statutory enactment now that the testing of gas was under revision; and he pointed out that even without statutory sanction, it is open to anyone to test with a flat-flame burner if he so desires. It is, of course, a little ridiculous to embroider a test for quality with something that is useless, and is certain to fall quickly into desuetude. The only thing that flat-flame testing will do is to show that the gas has some luminous value. But the fact that a gas is of 500 B.Th.U. or thereabouts will ensure that. However, the Committee decided that the ordinary illuminating power standard and test should go; and that flat-flame testing for information only might be continued by those who cared to give illuminating power testing a little longer run. There will not be many throughout the country who will trouble themselves over the matter.

A Closer Calorific Standard.

It has been more than once made abundantly clear that the authorities of the House have not been altogether favourable to the conditions of the calorific value clauses so far allowed. There has been a growing idea that the fixing of a standard with a 12 per cent. margin—a standard of 540 B.Th.U. gross, and a neutral zone till 475 B.Th.U. gross was reached—before penalties began to have effect was rather too loose, combined with an average of three days' testing. The Board of Trade, in their report, contended that it would be much better to fix a minimum only, and allow 5 per cent. play below it for emergencies and accidental lapses; so giving gas undertakings scope above the minimum to work for their own protection against the ignominy of having to pay forfeitures for deficiencies. Professor Boys, while he did not think that there was any real or serious detriment in having a range between 540 B.Th.U. and 475 B.Th.U., was also of opinion that a little more uniformity would be better. The Corporation of the City asked for a specific standard, below which there should be no margin. Professor Lewes preferred an absolute standard, to which gas undertakings could work without any margin, and thought 500 B.Th.U. gross would be fair. The suggestion of the Board of Trade was 500 B.Th.U., with 5 per cent. allowance. The Board, however, agree with what has been advanced in the "JOURNAL," that the number of B.Th.U. adopted as the standard should be decided in the case of every undertaking, and that in any model clause that is drawn up no specific figure should be mentioned, excepting 500 B.Th.U. gross in italics as a suggestion, in view of the different conditions existing in regard to available coal and carbonization practices.

The New Calorific Test.

What in the result happened is simply this. Lord Clinton's Committee have fixed in the case of the Gas Light and Coke Company a standard of 540 B.Th.U. gross—the same as in the South Suburban and other recent cases. This was the figure asked for. But the Committee have only allowed 7½ per cent. margin, instead of 12 per cent., before penalties for deficiencies will begin to operate. The minimum line has therefore been raised from 475 B.Th.U. gross to 499½ B.Th.U. gross. In view of this reduction of the margin, it would have been fairer to have also brought down the level of the standard—say, to 525 or 530 B.Th.U., so as to split the difference (or 510 B.Th.U., less 5 per cent., as offered by Sir Corbet), because while the Company's average calorific power last year was 540 B.Th.U., they on occasion and temporarily got perilously near to 500 B.Th.U. The argument for a lower standard is accentuated when we take into account the fact that the Company have been deprived of the advantage of the average of three days' testings for penalty purposes—being now restricted to the average of two tests in one day.

Fixed Conditions—Unfixed Standard.

There we have, unless further changes are made in the House of Commons (and this is not anticipated), the conditions of the calorific standard and test that will apply in the future; but we do hope the authorities of the House will recognize the point made by the Board of Trade and impress on Committees that the standard figure—the number of B.Th.U.—must be considered and fixed in the case of each gas undertaking, according to its conditions. There is just the danger that the Committees unless this point is brought before them will rigorously follow what has been done in the case of the Gas Light and Coke Company. The matter could be made quite clear in the clause which it is expected will appear in the "Model Clauses" for next session. One reason for making this point is that, in the case of the Ossett Corporation Bill, a calorific power standard of 520 B.Th.U. was asked for, on the ground that this would give the gas undertaking greater liberty to purchase coal; but the Chairman said the Committee would not depart from precedent, and left the matter over until the Gas Light decision is known. There is room for renewed argument on the point now as affecting Ossett. As to penalties, these, too, should vary according to the position and volume of business of the undertaking concerned. Penalties applied to a large company would be unfair in the case of a small one.

Surprise Tests.

There is one matter in connection with this inquiry into calorific testing to which attention should be called. While regretting the appearance of Mr. J. G. Newbigging on the opposition side in this parliamentary settlement of a calorific standard and test which will be serviceable to the progress of the gas industry, we do think that fair play was not altogether meted out to him. There is not the slightest objection, if one wants to checkmate an official gas engineer who is going to give certain evidence in opposition to a scheme, or a suggested change of any kind, to collect information regarding his own practices and achievements, including the testing of his gas for calorific value, illuminating power, percentage of inert constituents, and so forth. There is no reason why this should not be done at any time of the day and at any place. But fair play does suggest that sufficient time should be given to the engineer whose gas is to be the subject of such scrutiny, to send a man to check the tests, and to witness the conditions under which they are made. If the engineer does not respond to the invitation to have a representative present at the testing about to be made, the fault would then rest with him. "Surprise" tests (not made by the Gas Light and Coke Company) came quite as a shock to Mr. Newbigging in this case; and he did not know anything as to the conditions under which the tests were made, nor had he had an opportunity of checking the results. All he could do was to telegraph for the official tests for the day named, taken by an independent official of the Corporation, and next day he showed the Committee that there was disagreement between the results of the "surprise" tests and the official ones. But the Committee could not see that this had much, if anything, to do with them, and the case for London.

Demonstrations.

Committees are not averse to having the monotony of things broken by a little demonstration. We remember occasions when Sir George Livesey and Mr. Carpenter have by demonstration assisted Committees materially to an understanding of a certain position or matter. In the calorific test case last week, the Gas Light and Coke Company had, in a neighbouring room, calorimetrical and photometrical appliances fitted up, so that Lord Clinton's Committee could have explained to them properly how it was that, as Professor Boys put it, the illuminating power test was an "arbitrary one," and that "calorific value was the one thing that could be measured in a manner entirely natural and correct." Their Lordships took advantage of the presence of the apparatus to have a lesson in gas testing during a luncheon interval. When on the City Corporation Bill in which the promoters are asking for power to regulate the manufacture and storage of celluloid articles in view of the fire dangers attaching to them, Professor Vivian B. Lewes, by permission, violated all the traditions and the sanctity of the Parliamentary Committee Rooms, by

smoking a cigarette, and with this and a celluloid comb demonstrating the highly inflammable nature of the material, and the pungent and poisonous fumes to which the combustion gave rise. Before yet another Committee, the Birmingham Corporation were asking power to prohibit the inflation by air of meat exposed for public sale; and they had turned a room into a sort of butcher's shop. They had a couple of carcases of lambs hanging on a wall, and joints of veal exposed on the table, with the appliances used to inflate young meat, in order to give it a fictitious appearance. Demonstrations tell.

Testing Stations and Calorific Power.

When the Ossett Corporation Bill was before the Local Legislation Committee, the Horbury District Council were in opposition. Reference has already been made to the desire of the Corporation for a calorific standard of 520 B.Th.U. gross, with the penal line fixed at 475 B.Th.U.; and Mr. A. E. Mottram gave substantial reason why this standard should be allowed in their case. But the Committee resolved that the standard and test should abide by the result of the Gas Light Company's test case. What the Corporation asked for appeals to us as being quite fair. They were desiring something which they, with their local experience, deemed economically the best. They were also only requesting a margin of 8½ per cent. —1 per cent. more than the House of Lords Committee have decided to impose in the case of the Gas Light Company, and 3½ per cent. less than precedent granted. But the greatest discussion turned upon the question of giving Horbury a local testing-station, for which, particularly with a calorific power standard, there is not the slightest necessity. Whatever the amount of validity attaching to arguments for testing-stations away from works in connection with an illuminating power standard, there is not the same reason in connection with the more stable calorific power. There is no necessity for such stations in these times, so long as the quality is guarded at the works themselves. The Local Legislation Committee agreed with this; and refused the separate station for Horbury until such time as the Corporation supply gas from different sources, and then official testings are only to be made after "reasonable" notice. Those who are interested in the Dessau system should note Mr. E. H. Stevenson's evidence in connection with the installation of retort-settings at Ossett. He stated that Dessau vertical retorts of large capacity were being erected, and that there was no doubt that with this plant the quality of the gas would vary enormously. But later on he qualified this by admitting that storage brought about an admixture of the gas. Really it was a poor point for a gas engineer, with knowledge of the variation of charging hours and the diffusion of gases, to try to make before a Committee of Members of Parliament. There might have been a bad time for Mr. Stevenson if the Committee had been one of expert gas men.

No Amalgamation Sanctioned for the Margate and Broadstairs Gas Companies.

The Bill promoted by the Isle of Thanet (Margate) Gas Company gave rise last week to much discussion before Sir Harry Samuel's Committee; and it has ended in the withdrawal of what was the chief scheme of the promotion—the amalgamation of the Margate and Broadstairs Companies. There were several other proposals in the Bill which were (excepting the calorific testing matter, which is subject to the decision on the Gas Light Company's Bill) to be discussed yesterday. These included a site for new works, capital enlargement, the supply of gas for public purposes at a price 5 per cent. below the ordinary price (which the promoters desire to be interpreted as "for lighting"), the charge of 6d. for special meter readings (in seaside resorts there being many short-term residents), and other matters of more or less importance. But about the amalgamation proposal, both the Corporation of Margate and the Corporation of Broadstairs were opposed to it; but both Corporations expressed their willingness in the course of the proceedings to do their part in accommodating the Margate Company with a site in their respective areas. The two Companies at present occupy sites hemmed in by property; and it is readily conceivable that it might, under proper arrangements, have been a good thing for these neighbouring and popular seaside resorts to have had their gas supply provided from one works. Looking at the character of the points raised and discussed by the two Corporations in opposition to amalgamation, we cannot help thinking that there ought to have been a way out of the difficulties; and no doubt there would have been if a round-table conference had been arranged between, and plenary powers had been conferred upon, the advisers and experts retained by the parties—Sir Corbet Woodall, Mr. E. H. Stevenson, and Mr. W. A. Schultz for the promoting Company; Mr. Arthur Valon and Mr. Keen, C.A., for the Margate Corporation; and Mr. Frank Jones and Mr. William Cash for the Broadstairs Council. Of course, at the backs of expert advisers are boards of directors and local authorities whose veto may not always be exercised to the best advantage. The terms on which the amalgamation was proposed were objectionable to both Corporations; and they could not see that there would be, under the terms, any benefit to either Margate or Broadstairs. But now that the amalgamation scheme has been withdrawn, is it likely that the Margate Company will take their works to Broadstairs, unless, of course, they think there is a good prospective chance of amalgamation at a later date? It is a little significant, however, that it was made one of the terms of the withdrawal of the amalgamation scheme that the Margate Corporation should not further oppose the acquisition of the Broadstairs site by the Margate Company.

Higher Pressure Precedent.

While we must leave until next week reference to other decisions arrived at by the Committee on the Isle of Thanet Bill, it may be noted at once that the Committee yesterday departed from model clause and precedent by altering the prescribed pressure of gas to 20-10ths. Sir Corbet Woodall, on behalf of the Margate Company, offered 12-10ths; or 4-10ths more than the Model Clause prescribes. This provides: "All gas supplied by the to any consumer of gas shall be supplied at such a pressure as to balance a column of water not less than 8-10ths of an inch in height at the main, or as near as may be to the junction therewith of the service-pipe supplying the consumer." If 20-10ths were generally applied, we know of a few provincial districts which are not quite up to date in their distributing arrangements where there would have to be a smart overhauling of the mains.

Preston and Eaton Echoes.

Pitying Sir Harry Samuel and his colleagues in trying to understand the position in connection with the parliamentary application of the Wadhurst and District Gas Company, we will not inflict upon our readers any sketch here concerning the details of the proceedings. Suffice it to say that this is a promotion by a local gentleman, Mr. Venables, for the purpose of buying, and putting on to a sound basis, the Ticehurst and District Gas Company, which was one of the productions of a complicated set of transactions in which the Preston and Eaton promoting cliques had part. The Heathfield Company, another concern of the same brood, considered that their rights were affected by the Bill; and the owners of a small works at Burwash thought the same. Sir Harry Samuel—usually so smart at grasping the details of measures that come before him—described the case as a most surprising one, and in trying to understand it he said the details were sufficient to drive anyone to Colney Hatch. However, by the aid of Counsel, Mr. Andrew Dougall, and others, the Committee eventually succeeded in fathoming the rights in the matter; and they decided to cut out the Heathfield district from the proposed area of the Wadhurst Company, and suggested the payment to the owners of the Burwash works of £1000 for their property.

Longwood and Slaithwaite.

Immediately after the calorific "test case" was disposed of, Lord Clinton's Committee took up the Bill of the Longwood Gas Company, which is to empower amalgamation with the Slaithwaite Company, and to confer further capital authority. The room, after its crowded state during the calorific contest, wore almost a vacant appearance while the case for and against this Bill was presented. The proceedings did not last long—Mr. J. H. Brearley, the Manager of the Longwood Company, Mr. John Furness, the Manager of the Slaithwaite Company, with Mr. Henry Woodall, satisfying the Committee that the amalgamation would be a good thing, and that the fresh expenditure of capital would produce economy and an extended business. All the Committee ordered was that the price of gas in the Slaithwaite area should reach equality with Longwood in three years instead of five.

Miscellaneous.

The Liverpool Company's Bill came before Lord Clinton's Committee on Friday afternoon; and the proceedings were continued yesterday. Notice will be taken of them next week. Meantime, it may be stated that the Company have accepted the decision as to calorific value given in the Gas Light case. Mr. B. W. Smith, through the Walsall Corporation General Powers Bill, has persuaded the Local Legislation Committee that 13-candle gas, as tested by the "Metropolitan" No. 2 burner, is what Walsall requires, though, if the Committee had pressed it, he was quite prepared to take a calorific test in lieu of an illuminating power one. The British Gaslight Company's Bill has gone through unattacked and uninjured. The Deal and Walmer Gas Company have agreed not to exercise their electricity supply powers before next November, and not then if the local authorities decide to come to Parliament for powers on their own account. If they do, there are certain financial considerations that will have to be met by them. The Kingstown electric light question has been before Sir Edwin Cornwall's Committee; but more as to this later.

Some of our readers may remember that Mr. Harry S. While, of the firm of Messrs. Samuel While and Son, contracting gas engineers, has always made a hobby of clay modelling; and that two years ago he and Mrs. While, who is skilful at sculpture, were successful in having some of their productions accepted for exhibition at the Royal Academy. Mr. While's friends in the gas industry will, we are sure, be pleased to learn that this year he is showing two statuettes—one called "Siegfried" and the other "A Naiad." Curiously enough, Mrs. While also has had two works accepted—a portrait bust of Miss Constance Dawson and a statuette entitled "Echo." The fact of husband and wife, both of whom were amateurs, exhibiting two works each at the Royal Academy at the same time is, we believe, unique.

ELECTRICITY SUPPLY MEMORANDA.

The Electrical Use of the "Lancet" Tests.

With the habitual lack of fair-play that some of our electrical contemporaries show when dealing with gas affairs, it is not surprising to find that, alluding to the recent "Lancet" tests of gas-fires, they have altogether missed giving their readers the real point, as well as an explanation of the abnormal conditions, of the tests. If they had followed up the history of this matter, they would have known—we believe some of them do know—that by part of the gas industry (we have supported this) a standard for hygienic efficiency for gas-fires has been set up which in its stringency has no resemblance to the conditions under which the fires are used, but which test, if passed, would make the fires absolutely independent of flue-pipe and chimney, as well as gas-fitters' fads or carelessness, in preventing the bye-passing of even a small proportion of the combustion products—water vapour and carbonic acid—into the rooms where the fires were fitted. There was a little scratching at the conscience of "Meteor" of the "Electrical Times," after he had been rubbing into his readers the number of fires that showed leakage of fumes into the test-room; for he made the extremely modest admission at the tail-end of the paragraph that "the attachment of a flue and the creation of a healthy up-take draught cured most of the defects." We should not have been left with the feeling of an ill-conditioned spirit staring us in the face from the paragraph, if "Meteor" had stated plainly that the fires were tested in the middle of a room, so as to give them no assistance whatever from air-currents in the matter of the complete removal of the products of combustion through the fire flue-vent; and this is the standard of, and test for, hygienic efficiency to which gas-fire makers in their new types are working. Some of them think the standard ridiculously severe; but with, through commercial compulsion, the makers working to this standard, there will be no further need to have any reliance upon flue-pipe, chimney, or fitter, unless, of course, the chimney is one that goes in for alternating currents or consistently reverses the natural order of its operation. "Meteor" is struck by the fact that some of the older types of fires required, under the abnormal conditions of the test, a 4-feet length of flue-pipe before all trace was eliminated of products issuing from under the canopy—the fires being centred in the room, and away from the chimney draught. Has it not occurred to "Meteor" that 4 feet of flue-pipe would not be required—even by those fires that have become, according to the standard of construction of to-day, old-fashioned—with the fires subjected to the ordinary conditions of chimney draught?

"Meteor's" Pyrology.

Our journalistic friend also drops into his old muddled and stock notions as to the speedy and voluminous flight of heat units up a chimney when gas is the combustible. His view is so restricted that he cannot escape from the idea that the same conditions obtain in the case of the gas-fire as in that of the coal-fire; and while he taunts the "Lancet" with not having vouch-safed figures on the point, he also girds at it, almost with the same dip of ink, for stating that 50 to 60 per cent. of the heating value of the gas consumed is delivered in the radiant form to the room in which it is burned. We undertake to say that "Meteor" has never at any period of his life used the instruments employed in the scientific testing of the heat values of fires; but there are men of high scientific standing who have, and these men have put their names to results of gas-fire tests which give, in the most courteous yet emphatic manner possible, complete contradiction to "Meteor's" platitudes and hollow assertions. The tubes forming the radiants of the gas-fire, which are made incandescent by the immediate playing upon them of the high temperature of the regulated bunsen flame; the incandescing of the part of the fire-clay back behind the line of radiants which gives secondary support to the radiations of the latter; and the incandescent media being encased in a properly constructed stove which does not set up strong currents of air over the surface of the radiants—all constitute totally different conditions from the solid fuel fire, situated under a large open chimney, and with many thousands of cubic feet of air hourly passing through and over the fuel, to support combustion—every condition accelerating the escape of heat up the chimney, and so lessening the radiant heat passing into the room. Nevertheless, "Meteor" categorically says: "Even the total heat efficiency of the average gas-fire is not 50 per cent.; its radiated heat is nothing like 50 per cent." The 10 or 20 per cent. heat efficiency of the coal fire—pyrologist "Meteor" puts it at 10 per cent.—is no criterion that can be applied to the gas-fire, though our friend would desire it so. We should like to ask "Meteor" whether he can produce any one recognized gas-fire of last heating season's patterns the "total heat" efficiency of which was less than 50 per cent? Clothed himself in the purest assumption on the subject of gas-fire heat efficiencies, he dismisses the "Lancet" with the remark: "What a pity to spoil a series of very careful hygienic tests by a gratuitous flounder into the domain of a different science." "Meteor" should not take his favourite cap off his own head, and try to place it on the heads of other folks. It fits the usual wearer much better.

Baby Talk.

We may make one more quotation, but without comment, other than that in the side-head, from this electrical reference to the "Lancet" tests. "Meteor" writes: "There are several popular objections to the gas-fire, even against those stoves presented with a clean bill of hygiene. They emit a dry, parching heat; they are unsympathetic; they irritate the lungs and skin; they engender bile. But their greatest visible annoyance is the demand for matches. That is a nuisance which, alone, has turned the balance many a thousand times against gas. 'Where are the matches?' There is not only the nuisance of ringing or searching for matches—in the absence of male incendiaries—there is the woeful accumulation of matches and spills which demands such constant attention from the housemaid. It is a dusty and untidy job at best." We will ask "Meteor" to reply to three questions: How does he, in view of his list of so-called "popular objections," account for the popularity of the gas-fire as compared with that of the electric-radiator? How does he account for the fact that the makers of gas-fires have had to keep their huge establishments going at full pressure for months year after year to keep pace with the demand for the modern types of gas-fires? To what cause does he attribute the attack of the retail coal merchants on the gas-fire?

London in Time of War.

The report of Messrs. Merz and M'Lellan to the London County Council on the future of the electricity supply of London continues to afford topic for discussion in the electrical press, which is taking the matter very seriously, believing that amalgamation of undertakings and a large concentration of generating power must be brought about, but finding themselves in a bit of a quandary when they come to compare the average prices charged by some of the London concerns with those of undertakings a distance away that represent the best of models in concentration that are in existence. But there is one point about the whole discussion that is rather humorous. Sitting in their more or less comfortable arm-chairs, the electrical leader writers are doubtful as to the strategic policy of limiting the electricity supply of London to a few large generating stations on the Thames. They can already hear the bugle-call, the rattle of the drums, the clash of arms, and can smell the powder. They are fearful as to what may happen, if there is electrical concentration, in the time of war; the electrical economic aspect during the long intervals between the invasion of this country, *viâ* the Thames, by the navies and armies of other nations has less concern for them. It is obvious that the electrical leader writers have made up their minds that Germany or some other Power will sooner or later triumphantly send their ships along the Thames; that the British Navy, in the might of which we glory in the times of peace, will be powerless to prevent the invasions; and that the first targets to receive the inimical attentions of the enemy will be the electricity supply stations. The gas undertakings in and about London (that have been asking Parliament for river sites for their new stations) have great faith in our Navy; and the shareholders of the Gas Light and Coke Company and of the South Metropolitan Gas Company are not disposing of their investments because the mammoth Beckton works and mammoth East Greenwich works are situated on opposite banks of the Thames. Other gas concerns have stations along the river, but they have no fear as to future safety. The "Electrician" and the "Electrical Times" are filled with apprehension over the generating stations being made too vulnerable, which is not British like. The former says: "It is not desirable to rely merely on one or more large stations a considerable distance down the river, for strategic reasons. A hostile fleet might place the Metropolis in a serious plight by shelling such a station. It is therefore well to consider the desirability of extending some of the larger stations already in existence in other parts." The trembling "Electrical Times" also remarks: "The scheme would be too vulnerable if these works were all on the Thames between London and the estuary; there is room for a couple over west. A special point should be made of the public lighting; it means victory or defeat in time of war; it is not a question of efficiency. Why not reserve one of the old stations in the heart of London for this, and insist that a totally different fuel be used." It is positively clear that these two writers have not much faith in the provision made for the protection of London. It is also certain that they do not know anything as to the range of the ordnance of the present day, and that the inland generating stations, if the invaders got up the Thames, would be no better protected from their attentions than the stations on the banks of the river. Mr. A. Hugh Seabrook classifies as "rubbish" all the fears and vapourings of these Little Englanders; and we think he is right in his descriptive selection. But Mr. Seabrook also suggests that the Thames might be used as a cable way by dredging properly constructed cables deep into the middle of the bed of the river. In these days of divers and mines, short work could be made of the severance of cables along the bed of the river—if the enemy could get past its estuary; and the "Electrician" and "Electrical Times" are not sure that the enemy could not.

Capital Costs and the Average Price.

However, apart from the visions of the terrible plight into which London would be thrown by an enemy unkindly demolishing the electricity generating stations, our electrical contemporaries, while they think that centralization of

the generating power at a few stations is the right thing, are also a little doubtful as to the ultimate financial outcome of the scheme. Messrs. Merz and M'Lellan say that the proposed new undertaking must be made self-supporting at an early stage. But what with scrapping plant, and spending some millions on the erection of new works and modernizing and supplementing the distribution system, the electrical critics are not at all sure (in this they agree with what has previously been said in the "JOURNAL") that the financial outlook is all so certain and so rosy as is represented. The self-supporting stage must be a long way ahead. The reporters are all too optimistic, and have not taken sufficient heed of material obstacles to the consummation of their plans. They have not shown anywhere that the additional capital expenses will be counterbalanced by more economical generating costs. Moreover to get more economical generating costs, more business must be secured; and to obtain the increased custom current must, they admit, be sold at a decreased cost. The burden on generating economy looks heavier than it is likely to bear. However, it does not matter to the London gas industry what our electrical friends do in this connection. The heavier the capital obligations put upon the electricity supply, the better for the gas industry, so long as, if there are any deficiencies (and all the capital expended upon electricity supply in London is not at the present time receiving a dividend), the ratepayers of London are not called upon to provide the necessary to meet these deficiencies. The gas companies, who are among the largest ratepayers, do not want to have to make compulsory contribution towards supporting the fighting position of their rival. There is another objection that our electrical contemporaries, or those who look sanely at the matter, see, and that is the foolish use that is being made by the daily papers of average prices paid or predicted for electricity. Householders when they read of an average price of (say) about 1¾d. per unit, think that it will be a very fine thing in comparison with the 5d. or so that they are being charged per unit for lighting purposes. The average prices that are spoken of are not for these lighting consumers; and when they are disillusioned by concrete facts, it will not be a happy time for the electricity industry. It is a pity for anyone, however much he may believe in his cause, to overrate potentialities. The act is bound to recoil on him some day.

"Lest We Forget."

Our friends of the "Electrical Review" must have had many sleepless nights since the issue of the report of Mr. R. S. Redmayne, the Chief Inspector of Mines, upon the appalling disaster in the Senghenydd Mine, in which 439 lives were lost. Four hundred and thirty-nine lives! It has required a far less number of lost lives than that, when an accident has occasioned a fire on a train, to produce sleepless nights for our "Review" friends, and to cause them to wish they could wipe the horrible picture from their minds. But then the horror was deepened temporarily by the thought that gas was at the bottom of the mischief—so far as fire was concerned. This, of course, was an error, due more to (what shall we say?) prejudice than technical knowledge of what happens when gas is liberated from a vessel at high pressure. Now in his report Mr. Redmayne indicates plainly that he cannot get away from the view that this terrible loss of life at the Senghenydd mine was due to the sparking of a simple electric signalling apparatus. He refers to the disaster at the Bedwas Colliery in 1912, which was also due to sparking from an electric bell. Our electrical contemporaries tried hard to make a lamp in the lamp-room at the Senghenydd Colliery responsible for the accident, but Mr. Redmayne is of opinion that this was not the cause. Very big effects result from very little electrical causes, as numerous reports that have appeared in the "JOURNAL" show.

British Commercial Gas Association.—The next of the series of District Conferences will be held at Leicester on Friday next, when after a reception of members and visitors by the Mayor of Leicester (Councillor J. Russell Frears) and an address of welcome by Alderman T. Smith, J.P. (the Chairman of the Leicester Gas Committee), there will be an address by Mr. R. S. Hilton, of Birmingham (the Chairman of the District Conference Committee). A paper will then be read and discussed—"Salesmanship in Relation to Increased Gas Sales," by Mr. R. J. Rogers, of Birmingham. Professor Vivian B. Lewes will lecture in the evening on the "Hygienic Value of Coal Gas as an Illuminant and a Fuel;" and this will be followed by a reception.

No Gas Exhibit at this Year's Anglo-American Exhibition.—In announcing, with regret, that the suggestion made by the Chairman of the South Metropolitan Gas Company (Mr. Charles Carpenter, D.Sc.) for a display of modern gas lighting at the "White City" this year did not meet with sufficient support, and has therefore been abandoned, the Company's "Co-Partnership Journal" says: "Whether the leading gas undertakings were disappointed in the results of the National Gas Exhibition, or whether they were so sensible of the conspicuous success of that experiment that they did not wish anything done which might in any degree efface the happy memories which cluster round October, 1913, we are unable to determine. But we feel sure that an exhibit of artistic and hygienic gas illumination at the forthcoming Anglo-American Exhibition would have impressed many people who (not being gas employees or gas consumers) did not visit Shepherd's Bush last autumn."

WORK OF THE LEEDS UNIVERSITY.

Researches in Ventilation.

WE have received from Professor J. W. Cobb, B.Sc., the holder of the Livesey Chair of Coal Gas and Fuel Industries at the Leeds University, a copy of the tenth report of the University, covering the year 1912-13. It records the gratifying fact that the income was £3000 more than in 1911-12, due mainly to increases in grants from the Board of Education for technical instruction and from the Board of Agriculture, as well as to the restoration of the grant from the West Riding County Council to the figure at which it stood in 1908-9. On the other hand, the expenditure was fully as large as before. There was a further increase in the number of students. Of those registered there were 1026, against 981; of occasional students 86, against 68; and of evening students 208, against 182. Among the registered students, of whom 806 were men and 220 women, 893 were in the Faculties of Arts, Science, and Technology, and 147 in the Faculty of Medicine. The number of students preparing for Leeds degrees was 430; and 19 were reading for degrees in other universities.

At the suggestion of the Institution of Gas Engineers some research in ventilation has been undertaken in connection with the Coal Gas and Fuel Industries Department; and Mr. W. Harrison, M.Sc., has been appointed Research Chemist to assist in this work. The research is being conducted on the general lines laid down by a Joint Committee of the University and the Institution; the funds for the purpose being provided by the latter.

From the departmental reports we learn that the equipment of the laboratory of the Coal Gas and Fuel Industries Department was increased during the year by the purchase of a Worthington gas compressor, to facilitate experiments and demonstrations on high-pressure gas or high-pressure blast, commercial gas analysis apparatus and a calorimeter, platinum and silica ware, and a new larger electrical tube furnace. The University has made a grant for apparatus to be used in work on refractory materials; and the first purchase from this grant has been an electrical furnace designed for very high temperature work. The Senate elected Mr. H. Hollings to the Gas Research Fellowship in October, 1912. At the suggestion of the Head of the Department, and under his supervision, Mr. Hollings has been engaged on two lines of work: (1) Thermal stages in the carbonization of coal; and (2) a study of the influence of red-hot coke and of heat radiated from hot surfaces on the products of the carbonization of coal. Other work in progress includes the working-out of an apparatus for determining the heat conductivity of refractory materials, the investigation of the influence of dissolved oxygen in feed water on corrosion, conditions of ammonia recovery from coal, and the influence of lime on the fusibility of coal ash. The diploma courses have been modified to allow several options, including a four years' course for apprentices and pupils who can attend three days per week.

GAS FROM A MEDICAL POINT OF VIEW.

ON paying a visit last week to the Nursing Exhibition, in the Royal Horticultural Hall, Westminster, S.W., it was gratifying to see that, as on previous similar occasions, gas played a prominent part in the display. The exhibition is an important one of its kind, being held annually in conjunction with a national conference; and last week's was the seventh of the series. No better or more necessary propaganda work could possibly have been done than that represented by the active campaign among doctors and nurses which the gas industry generally has carried on in recent years. This is a direction in which a great deal of good work has been accomplished by the Gas Light and Coke Company; and one of the many ways they have selected for bringing forward, and keeping in the forefront, the advantages of gas from a medical point of view, is by having a show at the annual Nursing Exhibition. These displays have been good on previous occasions; but this year's, it may safely be said, was the best.

There are to the main hall two annexes; and it was in one of these that the Gas Light and Coke Company were installed. The position was an ideal one for the purpose; there being an available space of 44 feet by 22 feet, completely separated from, while at the same time really a part of, the somewhat crowded selection of stands in the body of the hall itself. The centre of the space was fitted up as a reception room or lounge, on one side of which were a bathroom and kitchen, and on the other a dining-room and bedroom. The furniture was tasteful; and the wall decorations were arranged to harmonize perfectly with it. Everything was in working order; the exhibit constituting an illustration of the uses of gas and of gas in use. It might have been in operation for months, or even years, so smoothly did it all work, and so substantial did it appear. The truth was, however, that the exhibition was only to remain open for five days, and that not more than one-half this amount of time had been spent in erecting the Gas Light and Coke Company's stand. The work was thus done in a hurry. No more time than that stated could be allowed; but it did not suffer in any way from this fact. It was necessary to run over 1000 feet of iron tubing; and 6 cwt. of lead pipe were used for hot and cold water and waste. Everything had to stand alone, without any nails being driven into the wall of the building

itself; and all the pipes and flues were hidden from sight between the walls of the stand and the walls of the building, where they were readily accessible.

The centre or reception room, and the stand generally, were lighted by eight Sugg 700-candle power low-pressure high-power lamps, operated by electric switches; and the light they gave made the performance of the electric lamps fixed in the body of the hall appear a very poor one indeed. In the dining-room there was a Richmond gas-fire, in bright finish, placed in a tiled recess, with a mahogany overmantel; while over the table hung a handsome three-burner pendant in polished brass, with a red-silk shade and bead trimmings. The bedroom next to this had in it all sorts of gas appliances suitable to the place—from the fire to the bed-warmer and the heater for curling-tongs. The Main fire was of a pattern appropriate for use where a nurse might be engaged—having at the side a ring burner which could be utilized for boiling a kettle, warming food, or for a bronchitis kettle. The white enamel overmantel imparted a restful appearance to the room, which was provided with a lavatory basin and a gas-heated Maughan geyser. The Nico inverted burners here and in the dining-room, kitchen, and bathroom, were provided with pneumatic switches. Crossing to the opposite side, one came to the bath-room, with its radiator and towel-dryer, and its geysers; and next to it was that very important place, the kitchen. Here the Davis cooking-stove was fixed in a ventilated tiled recess, with the Wright gas-heated circulator, which was connected with the circulating system supplying hot water to the different rooms. The kitchen was intended to represent one in a good sized house, where it would be used as a sitting-room for the servants after the day's work was done; and therefore there was a cosy little Fletcher gas-fire fitted on one side of the room. Of much use in sickness would be the gas-fan shown, the gas surgical instrument sterilizer, and the gas-heated water sterilizer. A useful domestic appliance exhibited is the Humphrey gas-iron.

It has been remarked that all the exhibit itself was a live one; and this applies also to the staff in attendance. There was a nurse, to give demonstrations of invalid cooking at intervals; and she appeared to be continually surrounded by a group of other nurses anxious for information of one kind or another. And those who did not seek information in this way could gather a great deal of useful knowledge from the brief announcements of the advantages of gas which were written round the top of the stand. There were some eighteen of these—all short, but to the point—such as, "Gas lighting saves your eyes;" and "A cook-general can do the work of two servants if gas is used instead of coal for cooking and heating." Attention was also drawn to the use of coke in the house, by the display of a Keith coke-heated boiler and a bag of broken coke as supplied by the Company for domestic purposes.

Gas is capable of being utilized in so many different ways that it is not a difficult thing to make a good display by its aid. Where the trouble comes is in thinking continually, as the years go by and the time comes round again and again for the different "class" exhibitions, of some fresh features with which to secure the attention of visitors. In this the staff of the Gas Light and Coke Company are eminently successful; and, difficult as it may seem to do, there is little doubt that those who go to the Nursing Exhibition of 1915 will see that in some direction or other means have been found of again improving upon the excellent display of gas in the exhibition just held.

WORKS TOPICS—XXXI.

By "Modus Operandi."

Emptying Ash-Pits before Clinkering.

The recent case in which a man claimed damages from the Fakenham Gas Company for injuries sustained while clinkering a furnace, raises the question as to the proper method of carrying out this work. It is quite clear that no operation of a risky nature should be countenanced by any employer; and it is risky to clinker a furnace with an ash-pit full of water. But it is a matter of common knowledge that workmen are very prone to run risks to save themselves trouble. "Familiarity breeds contempt" in the many daily operations carried out in gas-works; and it would surprise no gas manager to find a fireman clinkering a furnace with an ash-pit full of water, in spite of instructions to the contrary. Punishment usually follows the breaking of rules; but this will not always prevent a man from taking his chance of being discovered. In this case, it was the working manager who was clinkering the fire, and who was scalded by the dropping of a quantity of red-hot clinker into the ash-pit.

There is no gainsaying the fact that there is considerable danger in clinkering a furnace unless the ash-pit has first been emptied. Most ash-pits are fitted with overflow-pipes, which will allow quite 12 inches or more of water to be normally contained in the pit; but they are not, as a general rule, fitted with any drain-pipe. It is a common practice to provide the men with syphons for emptying the ash-pits; but the operation is somewhat tedious, and, as stated above, it is just the sort of duty that a workman scamps unless strict supervision is maintained.

Personally, I have for some time past made a practice of having all ash-pits fitted with a drain-pipe to enable the firemen to empty the pit before clinkering. The drain-pipe consists of a 2½-inch steam-pipe built in the front wall of the ash-pit, and flush with the bottom. On the outside a screwed plug is used for opening and closing the pipe. By this means, the ash-pit, containing about 60 gallons of water, can be completely emptied in two minutes. This arrangement is more satisfactory than using a syphon-pipe; and, owing to the small amount of trouble it entails, there is no temptation to the man to neglect the work.

In this case, it was stated that ashes could be used to soak-up the water, and that they could then be removed before clinkering was commenced. This may be effective, which I rather doubt; but it is in any case a laborious waste of work, which should be unnecessary. The moral of the accident is that efficient means for emptying the ash-pits should in all cases be provided.

Breeze Washing.

Quite a number of mechanical breeze washers have been installed in gas-works, with fairly successful results; and as there are a good many points to be studied in connection with their working, it will not be out of place to draw attention to the principles discussed in an article on "Coal Washing" by Mr. F. C. Lincoln, in the "Journal" for the 21st ult. [p. 178]. The theory of separation by washing is generally understood; but Mr. Lincoln goes further, and explains clearly one of the factors in efficient washing which is too frequently overlooked in practice, so far as gas-works are concerned. This is the extent to which the varying size of the material to be separated affects the efficiency of the process. This factor is based on a formula given and explained in the article.

It was shown that a piece of coal of a specific gravity of 1·2 with a diameter of 7 inches, and a piece of shale of a specific gravity of 2·4 with a diameter of 1 inch, will be similarly affected in a washing process. In fact, they will both drop out at the same end. Therefore, without discussing the matter further, it would appear that those engineers who have plants, or who contemplate installing them, could do worse than study this particular point. Unfortunately, the sizing of pan breeze and coke breeze—or rather small coke—before washing is expensive and inconvenient. It often necessitates a double handling and a good deal of additional initial outlay. But as the whole process depends for its success upon thoroughly efficient separation, the question cannot be disregarded. It would, therefore, seem that, to obtain maximum efficiency, either preliminary screening plant must be provided, and each size be washed separately, or a breaker must be used to reduce the material to a uniform size.

In connection with this question, it is undoubtedly a good plan to fix a bar screen over the elevator feed to a washer. By this means, a little extra manual labour in breaking the large pieces disposes of the difficulty to a material extent.

Working of Boilers.

It is interesting to notice that in the recent examination in "Gas Engineering" at the City and Guilds of London Institute one of the questions relates to the efficient working of boilers. The question is opportune; for there is no doubt that this branch of a gas engineer's duties is sadly neglected. Why it should be so, is not at all clear; but it is quite time that the efficient working of boilers was more closely studied in gas-works. As a preliminary step, it may be suggested that continuous records should be made of the evaporative efficiency of the fuel in general use. If weighing gear and water-meters are not already fixed, it can only be remarked that they are long overdue. Proper use of such apparatus invariably pays for itself in improved working.

Air-Lift Pumping.

Artesian wells with the air-lift arrangement of pumping are so generally used in gas-works, that a few words on this subject may be of interest. In cases where a diminution of the supply of water is observed, it is advisable to consider the question of the renewal of the tubing, as a good deal of corrosion takes place in these tubes, and it is quite possible in such cases that investigation will prove the necessity for taking this step. In a recent case which came under my notice, it was found that after about ten years' work the 2-inch air-tube used in these plants was leaking badly through a small hole of about ½ inch diameter at a point well below the water-level. This defect, as would be expected, completely upset the working of the plant, and could not be remedied without lifting the tubes. As there is a tendency in many districts for the water-level to fall, it is advisable, when the opportunity occurs, to lower the tubes, as was done in this case with most satisfactory results.

Temperature as a Factor in Purification.

The sluggish operation of purifiers is frequently due to the low temperature at which oxide of iron is caused to work. In fact the question of temperature has undoubtedly a greater effect on efficient purification than is generally supposed. How often it is noticed that when the cold weather is left behind and gas at the inlet to the purifiers becomes warmer, a sudden improvement in the activity of the oxide is observed. This being so, the idea of fitting steam-coils in the bottom of each purifier has much to commend it. By this means exact regulation of temperature can be maintained, and in a manner which is quite free from any disadvantage. This is not the case when the steam is blown directly into the gas-main. There is nothing so worrying to the gas manager as an unaccountable, and often sudden, failure of oxide to work properly; and it is thought that the emphasizing of the importance of temperature may be useful at this time of the year, when alterations can be more easily carried out.

NOTES FROM ABROAD.

Austro-Hungarian Association Meeting.

The thirty-third general meeting of the Austro-Hungarian Association of Gas and Water Engineers is to be held in Budapest from the 21st to the 24th of this month. On the first day there is to be a social gathering in the evening at the Hotel Hungaria. The morning of Friday, the 22nd, is to be occupied mainly with reading of papers, and in the afternoon an excursion will be made by steamer to see the new Obuda Gas-Works. On the Saturday morning the business of the Association will be transacted, and the reading of papers completed, while the afternoon will be devoted to the inspection of various works, a choice of which will be given to the members. On Sunday the members will be given an opportunity of seeing the sights of the town. Among the papers down for reading are several on the gas-works of Budapest, one by Herr Lux on Simmance gas-works instruments, and one on water-supply.

Hungarian Natural Gas.

On March 21 the Kissarmas-Torda-Marosujvar natural gas main, 75 kilometres (nearly 47 miles) in length, was opened, after a year had been spent in laying it. The total cost of the main was 3,500,000 krone (about £145,800).

New Coke and Gas Works in Canada.

It is probable that, as a result of the recent reduction by the Government of the import duty on bituminous coal entering Canada, a large coke and gas plant will be erected by the United Gas and Fuel Company, at Toronto, at a cost of $2,000,000 (about £416,000).

Purifiers Needed for Canada.

In accordance with a regulation just passed relating to the province of Ontario, Canada, all the natural gas companies are required to instal purifiers. This should cause a run on purifiers, and good business for those who have facilities for supplying this apparatus in Canada.

Continental Pipe Trade.

An important move in the pipe trade is reported in the amalgamation, by an interchange of shares, of the German Mannesmann Tube Company and the Schulz-Knaudt Company, of Huckingen. This will render the Mannesmann Company quite independent as regards raw material, and an increase of capital by £550,000 is contemplated, to increase the capacity of the steel works at Düsseldorf and erect new blast furnaces. This will considerably increase the competitive strength of the concern.

Berlin Electricity.

Towards the end of last year Berlin became dissatisfied with its existing agreements with the electricity suppliers, and it seems probable that other arrangements will be made when the contracts come to an end next year. It is likely that the mixed system, which is so much in vogue in Germany, will be adopted, by which the municipality acquires a large share of control on the board of the supplying concern. One of the suburban electricity works which is run by the local authority produces at ¼d. less per kilowatt-hour than two others which are companies. This would mean a saving of £400,000 a year if it were applied to the whole of Berlin.

Gas Used in Dry Cleaning.

The Central Illinois Light Company reports that the dry cleaning of clothes affords a good field for industrial output of gas. For this purpose quantities of heat and steam are required for cleaning, drying, pressing, &c., and gas is obviously the ideal fuel, saving the storing and handling of coal, its dirt, dust, smoke, and ashes, and many other disadvantages attaching to the use of solid fuel.

The Coal-Tar Colour Industry.

Preparations are being made by the French General Association of the Textile Industry to celebrate in 1916 the sixtieth anniversary of the discovery, in August, 1856, of the first of the coal-tar colours—the mauve of Perkin, which was followed by the beautiful series of artificial colours with which the world has become familiar. Ten years after Perkin's discovery, new methods were introduced into the industry; and the year 1916 will be the jubilee of the first application of closed vessels. In view of the occasion, a history of coal-tar colours will, according to the "Revue Scientifique," be written by Professor F. Reverdin, of Geneva.

Information Gained by Meter Inspectors.

A very thorough system is employed with success by the Gas and Electricity Company of Baltimore for discovering where there is room for expansion of business. The meter inspectors are supplied with special forms to fill in, showing what appliances are in use in each house. The information required is thus easily gained in a quite unobtrusive manner, and the Company is able to know where to apply for the fitting of a gas-cooker or gas-fire or other appliance that is not yet used in any household. At the same time the inspectors have orders to make immediate report to headquarters of any complaint, however trivial; and in case of a leak, his report is made at once by telephone. Attention to these quite small details, it is found, leads to satisfaction and increased business.

Displacing Coal-Consuming Appliances.

Some forceful advertising methods are reported from the Union Gas and Electricity Company of Cincinnati. Early in 1913 coupons were sent out with each gas bill, which were good for $2 in the purchase of any gas range sold by the Company, provided they were presented before March 1. During February 923 ranges were sold, against 172 for the previous February. Next the same system was applied to water heaters, and more were sold in six weeks than in the whole of 1912. Early this year offers were made to give customers $5 each for old gas ranges and old coal ranges, if new gas ranges were purchased at the same time—$5 being deducted from the list price, and the transaction including free fitting of the appliance. These methods have been attended by considerable success.

Efficiency in Application.

Mr. C. D. Bond, President of the Illuminating Engineering Society of America, speaking recently at a meeting of the Pennsylvania Gas Association, said: "When we utilize gas for heating, it is possible to get 100 per cent. efficiency, though conditions of ventilation reduce this in different degrees. When we utilize it for cooking, we get an efficiency of between 25 and 50 per cent. When we utilize it for power, we get an efficiency of between 30 and 35 per cent. But when we utilize it for lighting, we get an efficiency of not over 1 per cent. based on its energy content, and compared with the most efficient light thus far known. It becomes our grave duty, therefore, to make this 1 per cent. as useful and effective as possible." He urges that more attention should be paid by gas suppliers to the use of gas for illuminating purposes, with special reference to surroundings and room conditions.

The Cause of Glass Chimneys Breaking.

In a paragraph published lately in the "Ironmonger" attention was called to some experiments recently made by Herr Schäffer, in the laboratory of a Jena glass manufacturer, in regard to the changes due to service undergone by the glass chimneys of incandescent burners. He found that the continuous and prolonged action of the point of the flame brought about the devitrification of the glass, which became white, crystalline, and opaque at the heated part. When a flaw has thus been produced, the chimney is very easily cracked. The products of combustion also have a detrimental action; the most harmful being sulphuric acid. A deposit which it forms on the glass is composed principally of sulphate of sodium, for which the glass provides the sodium. The chimney eventually becomes so stained that no cleaning can restore it to its original brilliance.

A Large Sulphate of Ammonia Undertaking.

The report of the Badische Anilin- und Sodafabrik for the past year presents a record of successful working, and furnishes some interesting information as to the sulphate of ammonia branch of the Company's business, which was started for the production of synthetic ammonia, and in conjunction therewith sulphate of ammonia. This has been done to such effect as, according to the "Chemical Trade Journal," to upset completely the Continental sulphate of ammonia market, special in Germany; and the Company had to be conciliated practically on its own terms in entering into the combination of sulphate of ammonia producers in that country. How important is the Company's production relative to the whole may be seen from the estimate that at the end of 1915, when the extra plant now being erected will, it is expected, be in full operation, the output of sulphate of ammonia from this source alone will total about 130,000 tons.

High-Pressure Lighting and Distance Control in U.S.A.

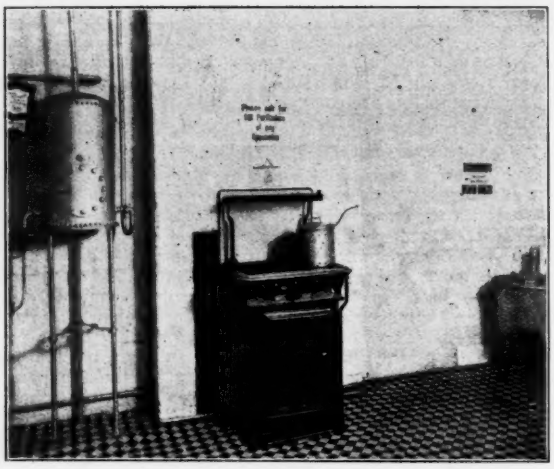
A question appears in the inquiry section of the April Bulletin of the National Commercial Gas Association of America: "Why is the high-pressure system of street lighting used in foreign countries not adopted by the gas companies in America?" One reason given in answer is that only one manufacturer in the country is making high-pressure lamps, and the European agents seem to have no facilities for handling large orders, and they expect the gas companies to hunt them up, and then wait months for delivery. The sender of the reply states that he has over thirty high-pressure lamps in use, which have mostly displaced electric arcs, and with great success. Is there no possible remedy for this state of affairs? An answer to a question as to whether there are any practical methods of lighting and extinguishing street-lamps from a distance states that pressure-wave and clock systems are both in large use abroad, and "a few installations have been made in this country." This looks like a chance for some one.

The Submarine Coal-Fields of Cape Breton.

An interesting description of the coal deposits on the northern coast of the Island of Cape Breton, Nova Scotia, was recently given by Mr. C. M. Odell at a meeting of the Mining Section of the Canadian Society of Civil Engineers. The coal-fields, which are destined to be one of the largest coal-producing centres in North America, are divided into four basins. At present the Dominion Coal Company control, by lease from the Nova Scotia Government, most of the coal areas on the southern side of Sydney Harbour, paying a royalty of 12½ c. per ton on all coal marketed; and this forms the greater part of the revenue of the Province of Nova Scotia. The coal is shipped mainly to the Sydney and Lewisburg Harbours, where modern shipping piers have been erected.

SOME VIEWS FROM THE COLCHESTER GAS EXHIBITION.

REFERENCE was made in our last issue [p. 289] to a successful gas exhibition which has been held at Colchester. It was promoted by the Colchester Gas Company, with the aid of the Richmond Gas Stove and Meter Company, Limited; and, as was remarked, the arrangements were such that Mr. W. W. Townsend (the Gas Company's Engineer and Manager) and all concerned were entitled to congratulation. The enterprise that has been displayed will have beneficial results as regards the gas business in Colchester. A feature of the exhibition was a series of model rooms, well furnished by Messrs. H. L. Griffin and Co., and fitted with Richmond fires, cookers, water-heaters, and other appliances. These rooms were specially well done; and photographs of them are reproduced here, in the belief that they will provide hints for other towns as to "how to do it." It may be added that the lighting appliances displayed were by the New Inverted Incandescent Gas-Lamp Company.



THE RECOVERY OF CYANOGEN COMPOUNDS AS AMMONIA.

[COMMUNICATED.]

THE conservation of ammonia, together with the prevention of its waste, receives so great a share of the gas engineer's study to-day that any process by means of which the total yield can be augmented must necessarily claim a good deal of attention. The material advance made in connection with ammonia recovery during the last decade may be said to be almost entirely due to precautions now taken in the collecting and storage of gas liquor; and the advance is all the more remarkable when it is remembered that the old practice of comparatively low temperature carbonization was decidedly more favourable to the production of this compound, which has been shown to be at a maximum at distillation temperature of about 1000° Fahr. Beyond the elimination of all leakage, probably little more can be done to improve the ammonia figure. It must to a great extent be dependent upon the retorting system employed, and the nitrogen content of the coal distilled. The present year, however, has seen a revival of interest in a process of comparatively long-standing, by means of which the cyanogen compounds resulting from carbonization may be almost wholly converted into ammonia. Some general reference to this development is to be found in the "JOURNAL" for March 10.

WHY CYANOGEN SHOULD BE REMOVED.

There is no disputing that modern high heats and the cessation of lime purification have been responsible for some considerable increase in the total quantity of cyanide compounds now present in the gas; and if such compounds could be readily removed and turned to profitable account, the task of the gas engineer would certainly be made easier. Apart from the fouling of gasholder water, and the possible corrosion of gasholder plates and other apparatus, the removal of the cyanide compounds is strongly to be urged, owing to their effect on the efficiency of the present-day purifying material. It is beyond doubt that oxide of iron—both natural and artificial—will remain in an active condition for a much greater length of time when the cyanides are absent, and both Bueb and Guillet have shown that in some cases the efficiency of the "dry" purifiers may be increased by as much as 50 per cent. In 1895, M. Perthuis, at the meeting of the Société Technique du Gaz, pointed out that, in certain circumstances, cyanogen is responsible for a reaction—not wholly understood—in the purifiers which may cause the material in them to actually increase the sulphur impurities in the gas.

Another objection to the presence of cyanogen is the small loss of ammonia it occasions owing to the inadvisability of working the final scrubber "clean" if the purifying medium is to be maintained in its most active state. It is fairly general, nowadays, to regulate the work of the scrubbers so that from $\frac{1}{2}$ to $\frac{3}{4}$ grain of ammonia per 100 cubic feet of gas passes into the purifying boxes. It may be explained here that the reason for doing this is that the small quantity of ammonia neutralizes the effect of the acid gases going forward; hence the oxide is maintained in an alkaline state. If this condition always prevails, the cyanide compounds travelling forward will combine with the ammonia and sulphur to form ammonium sulphocyanide; the latter being a soluble compound which runs away through the seal-pipes. If,

however, the material is acid in character—and it readily becomes so if no ammonia is permitted to travel forward—the cyanide compounds combine, with the formation of ferric ferrocyanide (Prussian blue). The latter being an insoluble substance forms a coating round the oxide particles—thus impairing their activity, and accounting for the greenish tint so often to be noticed in the spent material.

Conversion into Ammonia.

The idea of utilizing the nitrogen of cyanogen for recombination with hydrogen for the production of ammonia is by no means a novel one. Mention is made of the process in scientific literature published some seventy-five years ago; while a patent specification for another means was filed in 1882. So far as gas-works are concerned, however, the absence, until recently, of a process for the removal of cyanides, both economically and efficiently, has probably accounted for the indifference displayed towards this means of increasing the yield of ammonia; and the renewed effort to make the process a practical success was undoubtedly prompted by the introduction by Mr. P. E. Williams, in 1911, of the simple and sure polysulphide process.

As regards more recent investigation into the possibility of converting cyanides into ammonia, mention must first be made of the work of Henri Burgevin and Burkheiser. The former conducted his experiments with the cyanide compounds present in spent purifying material. Ammonia can be extracted from these by dry distillation, or by treatment with steam under pressure, followed by the use of alkalis, or by employing a mixture of soda and lime. Such processes are, however, unsatisfactory on a manufacturing scale, and Burgevin has overcome the drawbacks of using a costly reagent, soda; while by his method the incomplete nature of the re-action is avoided. The employment of lime alone is sufficient, while a recovery of practically the whole of the nitrogen is claimed. According to the patent specification, when cyanide compounds are recovered by means of raw purifying material, the latter must first be treated with some suitable solvent (such as carbon bisulphide) in order to ensure complete absence of free sulphur. The residue is then thoroughly intermixed with slaked lime in the correct proportions, and the two compounds are caused to re-act at red heat. The reaction is entirely completed at this temperature, and the gaseous mixture liberated will consist chiefly of free ammonia. If care is taken to see that the mixture is homogeneous, it is said that at least 95 per cent. of the original nitrogen in the cyanide compounds can be recovered in the form of ammonia. The approximate quantity of lime required for effecting the transformation is ten times (by weight) of the amount of nitrogen contained in the original material to be treated; and the patentee suggests that the ammonia should be converted into ammonium sulphate by passing the gas through a seal of sulphuric acid. The method also allows for the partial conversion into ammonia of the small proportion of nitrogen compounds, other than cyanides, which is to be found in purifying materials.

Recent Developments.

There is now no question as to the transformation of cyanides into ammonia being a practical success. Mr. Charles Carpenter, D.Sc., only a few weeks ago mentioned that his Company had for some time been investigating the subject, with the result that their process "had been worked on the small scale with extremely satisfactory yields, and appears to be peculiarly adapted to all gas-works and coke-ovens which work-up their own sulphate of ammonia." This process (which has been duly protected) is based on entirely original lines; and, although detailed particulars are not available, it appears to consist essentially of treating the recovered compound (in the form of a sulphocyanide) with an excess of sulphuric acid at some definite temperature, when ammonia, carbon oxysulphide, and acid sulphate of ammonia should result. It is well known, of course, that the action of sulphuric acid upon potassium sulphocyanide gives hydro-sulphocyanic acid—

$$KCNS + H_2SO_4 = HCNS + KHSO_4$$

the latter then being decomposed by water in the presence of an excess of sulphuric acid into carbon oxysulphide and ammonia—

$$HCNS + H_2O = NH_3 + COS.$$

In the case of ammonium sulphocyanide, the two reactions would be very similar in character; ammonium bisulphate resulting in the first place—

$$NH_4SCN + H_2SO_4 = HCNS + NH_4HSO_4.$$

The second reaction for conversion into ammonia is then similar to that given above. The process would appear to be somewhat delicate, owing to the fact that, if the working temperature is carried too high, the cyanogen is likely to be volatilized and lost in the form of hydro-sulphocyanic acid. Accordingly, temperature regulation plays an important part; but, working under good conditions, a conversion of 98 per cent. of the total nitrogen into ammonia should be possible. In addition to carbon oxysulphide being evolved, it seems probable that some sulphuretted hydrogen results from the reaction. This is most likely owing to the fact that carbon oxysulphide is freely absorbed by ammonia, and, on evaporation, yields sulphuretted hydrogen. It is feasible, too, that a portion of the carbon oxysulphide might split-up in the presence of water and steam, and yield carbon dioxide and sulphuretted hydrogen according to the following equation—

$$COS + H_2O = CO_2 + H_2S.$$

The Lime Method.

A second successful method is based on lines somewhat similar to those of Burgevin, and is particularly applicable in cases where hydrocyanic acid is recovered in the ammonium, and finally calcium sulphocyanide form, as is the case in the Williams's polysulphide process. As the latter method is likely to come into extended use in the future, this second means of conversion must be considered of some importance. The calcium sulphocyanide produced is firstly evaporated to dryness, and is then mixed with an excess of slaked lime, and subjected to a moderate heat of not less than 1000° Fahr. Under the influence of this temperature the cyanides are broken up in the presence of steam, and yield ammonia and carbon oxysulphide. The ammonia may be drawn off to an absorption vessel containing sulphuric acid, while the calcium oxysulphide will be mostly removed by the excess of lime. The manner in which the lime and cyanide are admixed is of no little importance for the effective working of the process. With regard to the actual reactions taking place, these appear to be on lines such as the following:—

$$(a)\ Ca(CNS)_2 + Ca(OH)_2 + 2H_2O = 2NH_3 + COS + CaCO_3 + CaS.$$

The precaution is taken of removing the carbon oxysulphide evolved by arranging for a layer of lime 2 or 3 inches deep to be placed over the mixture in the heating chamber. The carbon oxysulphide is then removed as follows:—

$$(b)\ COS + 2Ca(OH)_2 = CaS + CaCO_3 + 2H_2O.$$

The removal of the carbon oxysulphide in this way is essential; for ammonia and this compound may combine, with the possible formation of urea, according to the following equation;—

$$COS + 2NH_3 = H_2S + CO(NH_2)_2.$$

So far as the respective merits of the two more modern and successful processes are concerned, there is little to choose between them on the grounds of efficiency—both giving a conversion of about 98 per cent. For a works having its own sulphuric acid plant, however, or in cases where supplies of acid can be readily obtained, the sulphuric acid method would probably be the more simple. In the second method, use might conceivably be made of the waste heat from the retort-benches, or one or two retorts could be set apart for the special cyanide purpose. Furthermore, if it was not desired to recover the evolved ammonia there and then, it could be passed into the foul main along with the gas when, by absorption of sulphuretted hydrogen and carbonic acid, it would lighten the work of the ordinary purifying vessels.

Financial Considerations.

Stated baldly on paper, the actual financial gains resulting from the conversion of cyanides into ammonia do not appear to be particularly alluring. It has to be remembered, however, the indirect advantages accruing from the employment of a cyanogen plant are the chief recommendation of the process. At the present time the universal extraction of cyanide is scarcely feasible owing to the restricted market for this residual, and the growing tendency to produce it by other means; but if conversion into ammonia can be effected even at only a small profit, then more or less general extraction will be possible.

So far as the polysulphide process is concerned, the average cost of recovery is from 0·04d. to 0·05d. per lb., or about ¼d. per ton of coal carbonized. Assuming a yield of 5 lbs. of calcium sulphocyanide per ton, it will be seen that if this sells at 1d. per lb. the net profit is in the neighbourhood of 4¾d. per ton of coal carbonized. Then, if this quantity of calcium sulphocyanide was further worked-up into ammonia, it should give about 4¼ lbs. of sulphate of ammonia, thus increasing the total yield of the latter product from an average of 28 lbs. per ton of coal to 32¼ lbs. per ton, or by rather more than 15 per cent. With sulphate of ammonia selling at 1¼d. per lb., the additional revenue from this source would be about 5⅛d., against 4¾d. for cyanide. As before stated, however, this is by no means the only consideration; for the utility of the polysulphide plant in the way of restricting purification work is considerable. Under good conditions, the plant removes from 35 to 40 per cent. of the total sulphuretted hydrogen, and about one-third of the total quantity of ammonia. Accordingly, a moderate sized works normally employing 1000 tons of oxide a year would require only about 600 tons—this alone entailing a saving of something like £360 per annum.

Economizing Gas.—The following remarks appeared in the "Ironmonger" on Saturday week: "In spite of the general application of electricity for industrial lighting purposes there is still a very considerable consumption of gas; and a German investigator has shown that it is possible to economize in some cases up to 50 per cent. His method is to interpose in the principal gas-main a mixing apparatus composed of a small rotary compressor. The latter mixes 1½ parts of air with one part of gas, and impels this mixture at constant pressure through a main leading to the point of consumption. The burners have to be modified; for the admission of air must be reduced owing to the pre-mixture and the increased pressure, which would cause a greater suction of air than usual. The section of the tubes must also be increased. The further mixture of the secondary air at the burners takes place much more readily than when unmixed gas is used, owing to the difference in density being much less."

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting in Newcastle-on-Tyne.

THE members of the North of England Gas Managers' Association held their Seventy-Fourth Half-Yearly Meeting last Saturday, in the Queen's Hall, Tilley's Rooms, Newcastle-on-Tyne. The PRESIDENT (Mr. E. F. Hooper, of Sunderland) occupied the chair; and there was a large attendance.

APOLOGIES FOR ABSENCE.

The HON. SECRETARY (Mr. Herbert Lees, of Hexham) read letters of regret for inability to be present from Dr. W. H. Hadow, the Principal of Armstrong College; Professor Bedson; Mr. E. Allen, the President of the Institution of Gas Engineers; Mr. W. Doig Gibb; and others.

LOSSES BY DEATH.

The PRESIDENT mentioned with regret that during the past year the Association had lost two members by death—Mr. Alexander Allan, of Scarborough, and Mr. Fielder Duffin, of West Stanley.

ANNUAL ACCOUNTS.

The HON. SECRETARY presented a statement of accounts, and said it showed that the revenue for the past year had been £107 10s. 7d., and that there was a balance in hand of £13 18s. 10d. He pointed out that the assets of the Association included Newcastle and Gateshead Gas Company stock purchased at £191 5s. Those who knew the worth of the stock to-day would, he said, be well aware that this figure did not at all represent its present market value. It had been in the hands of the Association for a long time—longer than his connection with it. The members might take it that it was an old and an exceptionally good investment; and they were to be congratulated on the fact that they held it, and that their assets were considerably more than they appeared on the balance-sheet.

The statement of accounts was adopted.

NEW MEMBERS AND ASSOCIATES.

The HON. SECRETARY next submitted the following candidates as members and associates; and the nominations were agreed to:

Members.—Mr. John Kelly, Bridlington; Mr. Walter Hole, Leeds Corporation Gas-Mains and Distribution Department; Mr. W. J. B. Leech, Leeds Gas Department; Mr. W. W. Sykes, Stokesley, Yorks; Mr. G. Barker, Wolsingham, Durham; Mr. R. Ingham, Bedall, Yorks; Mr. Daniel Senior, Wetherby, Yorks; Mr. Joseph H. Pickering, Alston, Cumberland; Mr. A. W. Heathcote, Cleator Moor; and Mr. W. Hemingway, Richmond, Yorks.

Associates.—Mr. Thomas Stevenson, Hendon, Sunderland; Mr. J. E. Dixon, Hexham; Mr. W. Storey, Beamish, Durham; Mr. Barton Grainger, jun., West Hartlepool.

LECTURE BY PROFESSOR COBB.

Professor COBB then delivered a lecture on "A Problem of Modern Gas Practice," which will be found on p. 329.

THANKS TO THE LECTURER.

Mr. H. E. BLOOR (York) moved a vote of thanks to Professor Cobb for his lecture, which he said had been most luminous and interesting. Professor Cobb came before the members as the visible embodiment, as it were, of the wedding of science and practice. The day had not been long past when the so-called practical man ruled the roost in industrial matters and in the control of industrial processes. Such a man was one who knew what he saw with his eyes; and every vessel and every piece of apparatus employed in the process was to him, as it were, closed. He had really no eyes to see, though he thought he had. Time had gone on, and they had passed through the stages Professor Cobb had indicated—stages in which a simple commodity could be sold at a profit, owing to the imperative demand for it. Then there was the next stage, in which a little more close and economical working was compelled by the force of economic circumstances. And then, finally, there was the stage in which it was developed so that absolute, or nearly absolute, economy must be obtained, owing to the pressure of competition. These stages had been gone through in their own industry, as in others; and they were compelled, whether or not they had been trained on the practical side, to realize that they must take full advantage of the power of the scientific man to see inside a closed vessel and tell them what was going on there, and to point out to them how, by their hands and by the design of their plant, they might take advantage of the forces of Nature which were revealed to them. Professor Cobb stood before them that day as the embodiment of this comparatively new principle in industry; and they had to thank Sir George Livesey for realizing, at a comparatively early stage, the necessity of placing at the disposal of the gas industry the services of such men as the lecturer. One criticism of scientific investigations that was frequently made by thoughtless people was that they were quite useless. One person could not see why it should be of any interest to a man to take a frog's leg and experiment as to how it behaved under various kinds of treatment, and so forth. The answer was that many of their experiments were on a scale which was quite different from that of a commercial manufacturer. By carrying out experiments and observing comparatively minute phenomena, a time arrived when a body of information was built up, and another man came along—one with scientific knowledge and a practical mind—and he discovered that some remote scientific fact had a profound bearing upon a practical problem of the day. Such a case was that of Welsbach with the incandescent mantle. Pure science ultimately developed into practical science. Professor Cobb had remarked during his lecture, that the industrial equivalent of the laboratory method for the estimation of nitrogen in coal had not yet been obtained, and he proceeded to say was not likely to be obtained. This might be so; and therefore it might seem to be a waste of time to proceed along laboratory lines. They knew, or they ought to know by now, from experience, that the day would probably come when the investigations of Professor Cobb and others would be gathered up—when the various points they had raised would be joined together—and the ultimate results of these experiments might be a degree of perfection in obtaining nitrogen from coal which was far beyond their present anticipations or hopes. It was a singularly interesting point, that the longer the period of carbonization a greater amount of nitrogen was actually given off from the coal; and a further point, which he thought would be of interest, was that Professor Cobb mentioned that it was difficult to get a sufficiently fine mixture of lime with the coal in the liming process. If he (Mr. Bloor) might venture a suggestion, he considered it would be very interesting to have the experiments carried out in the silica tube repeated with a very fine admixture of coal and lime—the coal and lime to be ground together to an exceedingly fine state. A repetition of the experiments in this way would be most interesting, as showing the maximum possible to be obtained by the use of lime. It was always very valuable to know what was the ideal, so that they might measure their efforts to obtain it.

Mr. R. WATSON (Doncaster) seconded the proposal. He remarked that at a time when they were all hunting for means of economy in connection with gas manufacture, due to the high price of coal and the unfortunate drop in the amount realized from the residuals, they were anxious and eager to have all the hints they possibly could get as to how to conserve and increase their sources of revenue. They had only recently had reminders that they might obviate considerable waste of money by seeing that ammonia was not evaporated at the different points of their works; and he thought, after such reminders, they were particularly indebted to Professor Cobb for having brought this matter so closely under their notice as he had done. He showed how they might, in the initial stages of gas manufacture—in the retort itself—devise means, or attempt to do so, and pay special attention to methods, whereby they might improve their ammonia results. Only a week or two previously, he, as a member of the Council of the Gas Institution, visited Leeds University, where they were welcomed cordially by Professor Cobb and his colleagues, and were conducted over the laboratories; and it was indeed a great pleasure to them all to see some of the apparatus which had been shown on the screen—that, in particular, which indicated the effect of high temperature in the retorts upon the ammonia involved in the result.

The vote of thanks having been accorded with enthusiasm,

Professor COBB briefly replied. He said he was very glad indeed to have had the opportunity of making the acquaintance of so many of the gas engineers of the North of England, and to be able to think that, in the opinion at any rate of certain of them, some of the work they were able to do in the laboratory was going to be of service. Mr. Bloor made some suggestions as to laboratory experiments in liming; and he (Professor Cobb) was happy to be able to state that, though the results were not yet in a condition to be brought forward, experiments of the kind referred to were on their way. A large number of them had been made. Most definite results had been obtained as to the action of gas on coal; but the action of lime was one of the things that were studied in the same series of experiments. It had always been found difficult to obtain definite figures for lime; and this had been his experience on the laboratory scale also. But he did not wish to bring forward any figures prematurely.

The PRESIDENT expressed the hope that Professor Cobb's lecture would lead to a good sheaf of information being forthcoming from their own members at future meetings.

ELECTION OF OFFICE BEARERS.

The election of officers for the ensuing year was announced as follows:—

President.—Mr. Thomas Waddom, of Newcastle.
Vice-President.—Mr. M. Fligg, of Redcar.
Hon. Secretary and Treasurer.—Mr. Herbert Lees, of Hexham.
Auditor.—Mr. W. Garbutt, of Newcastle.
Members of Committee.—Mr. Norman Cox, of Sunderland, and Mr. J. Eadington, of Blyth.

Mr. WADDOM thanked the members for having elected him President. He assured them that he entered upon the office with

fear and trembling, seeing they had such a number of learned and scientific men among them. He did not profess to be either learned or scientific; but did claim to have a little knowledge of gas undertakings in a business capacity, which he thought was a quality they all required very much at the present time. He would be pleased indeed to welcome them to Newcastle for the meeting in October. He hoped that by then he would be able to show them at Elswick something in the way of vertical retorts. If the present section upon which they were engaged was completed, they would be able to do so. He hoped the Directors of his Company would show them the hospitality they had displayed on previous similar occasions.

VOTES OF THANKS.

Mr. T. HARDIE (Newcastle) moved a vote of thanks to the retiring President and the Committee.

Mr. A. H. BAGSHAW (Sunderland) seconded the motion; and it was agreed to.

The PRESIDENT replied, and said his work had been greatly lightened by the valuable services of the Hon. Secretary (Mr. Lees) and the Committee.

Mr. LEES also responded. He said, as he had held the office for twelve years, he hoped the Committee would be looking out for a suitable successor. In the meantime, he must say how grateful he was to the members. His official connection with the Association had brought him into touch with men who were high in the profession and with others who were managing small works; and he was glad to count among both sections many close personal friends.

The proceedings then terminated.

THE LUNCHEON.

At the close of the meeting, a luncheon was held in the King's Hall, Tilley's Rooms—the PRESIDENT of the Association (Mr. E. F. Hooper) being in the chair. He was supported by the incoming President (Mr. Thomas Waddom), Professor Cobb, Mr. Herbert Lees, and others.

Professor COBB proposed "The North of England Gas Managers' Association." He said the past history of the Association was not so important as what was being done at the present time. Its part was infinitesimal when compared with what it was going to be. It was for the younger members to carry the flag into the future, and see that the gas industry flourished as it had never done before. The Association had one great advantage. There was pervading it a catholicity of spirit which was going to tell in the future. They drew their members and associates not only from the gas industry in the narrow sense, but also from the coke-oven industry. They drew their President, Mr. Hooper, from the bye-product industry. This was going to be of special advantage in the future, because he believed he would be a very bold man who would stand up and say that twenty-five years hence gas was going to be made by this particular process or that particular plant. The most economical method of making gas was going to be determined by conditions local and otherwise; and the whole science of carbonization would have to be brought into play by the men who were to be called in to advise as to the proper processes to adopt. In this way he considered that the catholicity of spirit the Association showed in its membership would be of positive use and considerable value. They were fully alive to the fact than an industry, however great, which was going to be dependent upon tradition and upon methods of empiricism and methods of the past, was a doomed one. Now, the gas industry was not a doomed industry at all. The dose which electricity—its great rival, and in disguise its friend—had administered to it in times past had acted on a healthy constitution, and had proved not to be a sleeping draught but a stimulant. By being so stimulated, it recognized a need; and it was by being determined to satisfy this need that the gas industry would draw upon the best brains available, and upon the best sort of training, in order to extend its work into new fields, and become more thorough in those in which it was already working. It was in this way that Associations like theirs were going to help the gas industry forward. It rested with the Association and with kindred bodies to carry out the determination which they were already expressing; and it was in the confidence that they would bring this determination to fruition that he had the greatest pleasure in proposing the toast with which he had been entrusted.

The PRESIDENT, in responding, referred with pleasure to the number of papers which had emanated from the North-Eastern district of England, and said he considered they were at least equal to anything of the kind produced in other parts of the country. They had just had a considerable accession of members and associates; and it was as well for these to understand that papers would be expected from them. The President next referred to a course of lectures to be given at the Armstrong College next session on "Refractory Materials," and said they would be delivered by one of the ablest technologists on the subject. They had often discussed the engineering and technical sides of the gas industry; but he thought they all needed to look a little more than they had done at the semi-public side. The industry might be helped a good deal more, popularly and scientifically, by the aid of lectures and the exhibition of good films. There were people who looked upon gas as unhealthy. But they did not understand the question of ventilation and the movement of air; and if more scientific information were placed at the disposal of the people, it would tend not only to their improved health, but to the better use of gas in many directions. The scientific side appealed to them in other ways. Some two or three years ago, the President of the Society of Chemical Industry—an American—in his address dealt with a factor which he (Mr. Hooper) thought might very well be transferred to England. The address was on the subject of the conservation of national resources; and the author spoke about the work that had been done in the United States to preserve the coal, petroleum, timber, and mineral resources. England, of course, did not possess anything like the resources of the United States. The main raw material in this country was coal; and anything that could be done scientifically or technically to extend the best use of it and its products should be encouraged in every possible way.

Mr. WADDOM proposed "Kindred Associations," to which Mr. DAVID VASS, President of the North British Association, responded.

A PROBLEM OF MODERN GAS PRACTICE.

By Professor J. W. COBB, B.Sc., F.I.C., of Leeds.

[A Lecture delivered to the North of England Gas Managers' Association, May 2.]

When your Secretary, Mr. Lees, invited me to address you last October, I was not able to do so, because the date of your meeting fell during the first week of the University session. But I expressed a hope that it was only a pleasure postponed; and when you gave me another invitation later in November, I was very pleased to accept it. The Livesey Professorship, which I have the honour to hold, is by its name identified with the gas industry; and the work of the Department under my control does, and will, I hope, maintain that association in fact.

Turning to the subject of my address, any productive industry may be regarded as evolving through several stages. In the first stage its main product, whatever that may be, is of exclusive importance; and anything else which it inevitably produces at the same time is regarded as a nuisance, and being committed to the rubbish-tip or the stream ceases to be of importance excepting as a devastating influence. In an intermediate stage perhaps the bye-products are tolerated; and in time a more advanced stage is reached in which the intelligent use and disposal of bye-products may make the difference between economic success and failure. Chlorine in alkali manufacture, and phosphorus in the steel industry, may be quoted as examples of all-important bye-products with such a history. The gas industry has its own; and in connection with these the scientific work of a gas engineer, or especially of a gas-chemist, finds obvious application, and, always assuming that a proper perspective is maintained, is likely to prove of service.

I propose to deal briefly in this address with the possibilities which lie before us in recovering nitrogen from coal as ammonia, and the necessary limitations imposed by practical conditions. As illustrating the possibilities, and ignoring the limitations, it may be pointed out that if the nitrogen from a ton of coal could be recovered entirely as ammonia, in the form of ammonium sulphate, it would be worth about 14s. The average recovery in gas-retort and coke-oven practice is about one-fifth of this ideal figure.

WORK IN THE LABORATORY.

Let us now consider what happens on the laboratory scale, where conditions are so much more controllable than in works practice when raw coal is treated for the recovery of ammonia. Taking low temperatures first, it is interesting to note that nitrogen does not occur in such a form in raw coal as to be liberated in the form of ammonia by boiling with an alkali; but it is found that on oxidizing coal to some extent by heating to 200° C. for some days, a change occurs which makes it possible to obtain some ammonia in this way. Moreover, the ordinary Kjeldahl process for estimating nitrogen in coal is based upon completely converting the nitrogen into a form from which it can be expelled as ammonia by alkali. It involves the preliminary boiling of the coal with sulphuric acid and an oxygen carrier. This laboratory expedient has never found, nor does it seem likely to find, its industrial equivalent.

Heating the coal out of contact with air, at higher temperatures—the carbonizing process—is what we depend upon for ammonia recovery; and it will be of interest to trace the conditions of success. Pictet and Bouvier* have made careful laboratory experiments on the behaviour of a French coal carbonized carefully up to temperatures of about 450° C. in a vacuum. They obtained no ammonia. In this country, Wheeler and his collaborators have made similar experiments, with almost the same results, though they did obtain traces of ammonia and of pyridine bases. A difference between the two sets of experiments was that, whereas a carbonization by Pictet and Bouvier occupied five hours, it required at the hands of Burgess and Wheeler five weeks. In the English experiments, the coal was distilled in an inverted Jena glass retort, in order to secure the minimum of heat action on any products of distillation; and, as in the French experiment, a vacuum was maintained throughout.

The result of slow distillation has also been tested by Christie, who divided the product into portions corresponding with temperature intervals of 50° C. from 250° to 900° C. In his experiments, the pressure maintained throughout was atmospheric, so that one disturbing influence as regards comparison with ordinary large-scale practice was absent. Many coals have been tested under these conditions; and the results, as in the case of Pictet and Bouvier, and Burgess and Wheeler, were emphatically indicative of the almost complete absence of ammonia in the distillation products up to a temperature of 500° C. I wish to emphasize the agreement of these investigators as bearing on what is known

* See "Comptes Rendus," 1913, pp. 157, 719; also this "JOURNAL," Vol. CXXIV., p. 814.

as low-temperature carbonization in practice, concerning which it is desirable to remove misconceptions.

Low-Temperature Carbonization.

Burgess and Wheeler have been quoted as having found in their researches, "in every case, that the largest yield of ammonia took place with the lowest temperatures employed."* This deduction is only made by taking into account the percentage of ammonia in the gas liberated in each temperature interval, while ignoring the volume. This can be seen by an inspection of Tables I. and II., where the total volume of ammonia is calculated, and found to follow a very different rule.

Table I.

Fractional Distillation in Vacuo.

Bituminous Coal A. 1·42 per Cent. N_2.

Temperature.	Volume of Gas. C.C. per 2 Gms. Coal.	Percentage NH_3 in Gas.	Volume of NH_3. C.C. per 2 Gms. Coal.
15 to 350	3·5	5·60	0·20
400	18·0	2·25	0·40
450	47·0	1·20	0·56
500	59·5	1·10	0·65
550	81·0	1·45	1·18
600	98·0	0·50	0·49
650	106·0	*Nil*	*Nil*

Table II.

Fractional Distillation in Vacuo.

Semi-bituminous Coal. 2·99 per Cent. N_2.

Temperature.	Volume of Gas. C.C. per 2 Gms. Coal.	Percentage NH_3 in Gas.	Volume of NH_3. C.C. per 2 Gms. Coal.
15 to 350	0·95	2 50	0 02
450	38·05	2·35	0·89
550	186·20	0·60	1·12
600	111·50	0·15	0·17
650	179·10	*nil*	*nil*

Table III.

Volume of Ammonia found in Gas, C.C. per Gm. of Ashless Dry Coal.

Temperature of Distillation.	Coal.			
	A. 1·42 per Cent. N_2.	B. 0·99 per Cent. N_2.	C. 1·09 per Cent. N_2.	D. 2·99 per Cent. N_2.
450	0·56	..	..	..
500	0·40	..	0·67	0 40
600	1·38	0·89	0 58	..
700	1·98	..	1·48	0·75
800	2·18	..	1·76	1·16
900	*2·68	..	*nil*	0·74
1000	..	..	*nil*	0·57
1100	..	*nil*	*nil*	0·33

* Equivalent to 11·8 per cent. of the nitrogen in the coal.

The results in Tables I. and II. are for fractional distillation *in vacuo;* but others obtained without vacuum by more rapid distillation at various temperatures without fractionating, and collected in Table III., are to the same effect—the percentage richness in ammonia at low temperatures being quite deceptive unless the very small volume of gas obtained is taken into account. Moreover, it is to be remembered that Burgess and Wheeler were only concerned in the experiments from which I have deduced Tables I., II., and III. with ammonia obtained in gas, liquids being excluded for examination; and that they did not attempt to draw conclusions as to ammonia yields.

Leaving, now, the consideration of ammonia yield up to 500° C. and dealing with Christie's experiments as continued to higher temperatures, a noticeable phenomenon was the very large amount of ammonia evolved between the temperatures of 500° to 700° C., which was found to be the dominant period. Above 700° the yield fell away; and it was almost *nil* at 800° C.—not necessarily because no ammonia was formed at that temperature, but because it could not exist for any appreciable time. The ammonia obtained in a number of experiments made on these lines has been found on the average to be about twice as much as in ordinary coke-oven or gas-retort practice; and what is primarily emphasized is the value of very slow distillation through the range of 500° to 700° C. A double importance probably attaches to the slow rise in temperature. In the first place, ammonia is easily decomposed by heat, so that it should be produced at as low a temperature as possible, in order to avoid decomposition after its formation, and should be removed as quickly as practicable for the same reason. It is to be remembered that the percentage of ammonia which can exist at ordinary pressures in equilibrium, or in permanence, at any but low temperatures is really very small. The figures obtained by Haber and Le Rossignol ["Zeit. fur Elektrochemie," 1908 (14), 180] are as follows:

Temperature.		Percentage of Ammonia at One Atmosphere.
700°	..	0·022
800°	..	0·011
1000°	..	0·004

Even on passing ammonia through a porcelain tube packed with fragments of porcelain, when the time of contact was comparatively short, and certainly not sufficient for the attainment of the equilibrium, Ramsey and Young obtained the following results:—

Temperature.		Percentage of Ammonia Decomposed.
500° C.	..	1·57
600°	..	18·28
690°	..	47·71
810° to 830°	..	69·50

With an iron tube the decomposition went further still.

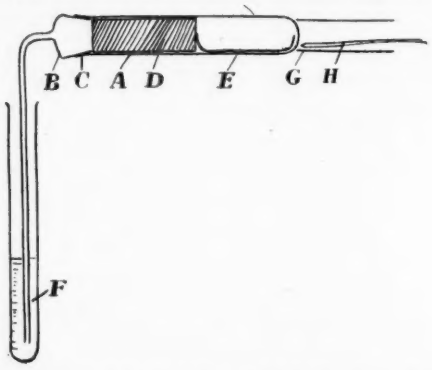
* Lewes on the "Carbonization of Coal," p. 255.

The Question of Ammonia Yield.

Supposing the charge in a horizontal retort is at 800° C., and the gas above it contains 50 per cent. of hydrogen, 5 per cent. of nitrogen, and 1·2 per cent. of ammonia, it is possible to calculate how much of this ammonia could remain permanently undecomposed—that is, in equilibrium—assuming gases other than those mentioned to be inert. The result of such a calculation shows that 99¾ per cent. of the ammonia would be unable to continue in existence. Under these conditions—which are quite reasonably near those of practice—the whole success of the process from the ammonia standpoint hinges upon removing the ammonia before equilibrium is attained. Moreover, since the decomposition of ammonia increases so rapidly as the temperature rises, it is obviously advisable, for the best yield, to ensure that each fraction of the yield is obtained at as low a temperature as possible, and hurried away before the temperature rises further. For this reason alone, it is not surprising that results can be obtained by very slow laboratory distillation which are very different from those we are accustomed to see.

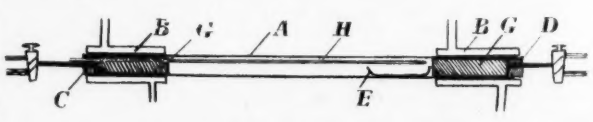
The quicker carbonizing necessary in large-scale practice for economic reasons, lessens the ammonia yield in another way. It is very probable that compounds which might yield ammonia if they were allowed time at the right temperature, are converted into other compounds less obliging in this respect. Thus it has been found repeatedly that a coal distilled quickly gives more nitrogen in the coke residue than the same coal distilled slowly. It is not simply that more ammonia is decomposed in rapid distillation, but less nitrogen comes out of the coal in any form. There are other conditions of large-scale carbonizing practice which tend to destroy ammonia—such as the influence of red-hot coke, and perhaps the action of radiant heat.

The following experiments made for me by Mr. Hollings, in the laboratory of the University at Leeds, are illustrative. They were carried out to determine the influence on ammonia yield of the two agencies mentioned. In the first place, a coal was so carbonized that the ammonia escaped as quickly as possible after leaving the coal. The apparatus used is shown in the first figure.



A is a retort 1 inch in diameter, and 6 inches long, closed at one end with a mouthpiece and delivery tube B, fitting with a ground joint, as shown at C. D is a fire-clay plug almost closing the tube, and E a boat for containing the coal. To estimate the temperature attained, another tube G of similar thickness was placed in the position indicated, and a thermo-couple H introduced. The temperature used in this and the succeeding experiments was 800° C. The volatile products passed through the delivery tube and through dilute sulphuric acid in F, as shown. Three grammes of coal were taken out for each experiment.

For the comparison which it was desired to make, other carbonizations were then carried out in the apparatus shown in the second figure.



Water-jackets were so applied to the ends of the tube A there illustrated as to prevent charring of the corks at each end, without causing any condensation of ammoniacal liquor distilled—a point of obvious importance. When it was desired to investigate the action of a column of red-hot coke, the tube A was filled from the boat E as far as the loose fire-clay plug G with small pieces of coke; and when we wished to observe the action of radiant heat, or more exactly the influence of passing through a tube with a red-

hot bounding surface, the coke packing between E and G was left out.

To summarize the results obtained: With minimum heat action, 22·5 per cent. of the total nitrogen in the coal was, on the average, secured as ammonia. With the unpacked tube (radiant heat), this was reduced to 17·2 per cent., and when the gases had to pass through the red-hot coke before their exit, a further reduction to 9·4 per cent. was observed. Manifestly, important deteriorating influences had been exercised, particularly by the red-hot coke.

Speeding-up Ammonia Evolution.

Having regard to the considerations above mentioned, and the necessities of carbonization in practice—particularly the output required per unit of plant for commercially economical working—it is not difficult to see why the yield of ammonia falls so far short of what is possible under ideal conditions. Coal is distilled quickly through the ammonia-yielding range. Some ammonia formed is decomposed—either by direct dissociation, or at higher temperatures by the formation of cyanogen compounds—and refractory nitrogen compounds which do not easily yield ammonia seem to be formed and are left in the coke.

I quote from the article on "Ammonia" [Colman] in "Thorpe's Dictionary of Applied Chemistry" the following figures as indicating results obtained in normal practice.

	Gas-Works. M'Leod. Per Cent.		Coke-Ovens. Short. Per Cent.
Nitrogen in coke	58·3	..	43·3
,, ,, tar	3·9	..	3·0
,, ,, ammonia	17·1	..	15·2
,, ,, cyanogen	1·2	..	1·4
Free nitrogen in gas	19·5	..	37·1

One means of speeding-up the ammonia evolution from coal, which was originated by Cooper—namely, the addition of lime—has been revived recently by Paterson, who has realized the necessity of intimate contact if the lime is to effect its purpose, and has done something to satisfy this requirement by operating the lime addition with a spray, so that each coal particle may be coated with lime. It is, however, difficult to understand how a sufficiently intimate contact between the lime and coal to admit of very satisfactory chemical re-action can be ensured, without either complete fusion of the coal or very fine grinding.

Effect of Gases on Ammonia Yield.

Considering another condition of practice, there is no doubt that the action of the different gases surrounding the coal during its distillation will have an influence on the yield of ammonia. Some experiments made for me by Mr. C. A. King, in the laboratory of the Farnley Iron Company, are of interest in this connection. Coal (2 grammes) was distilled in a silica tube, through which was passed a rapid current of the gas to be tested, so as to obtain a preponderating amount of this gas in the space over the coal. The tube was maintained at 800° C., and ammonia was determined in the stream of gas issuing. The results to which I will call your attention were obtained when coke was used instead of coal.

With carbon monoxide, carbon dioxide, or nitrogen, little or no ammonia was liberated. With carefully dried hydrogen, about 10 per cent. of the nitrogen of the coke was liberated as ammonia [less than Tervet found in similar experiments]. When, however, water vapour was used, or hydrogen and water vapour in equal volume, the nitrogen obtained as ammonia was very much increased, and sometimes approximated to the total nitrogen present. The conditions for obtaining this high yield have obviously ceased to be those of ordinary carbonizing. They are more nearly those of the water-gas process. The water vapour necessary for the decomposition of the nitrogen compounds also oxidizes the coke, though the liberation of the nitrogen as ammonia does not seem to depend on the ashing of the coke, which may not go very far.

I should point out, as important in its bearing on practice, that if the coke is of a hard description—such as a bee-hive metallurgical coke, which I tried in some experiments—the action of steam upon it, either in liberating ammonia or in reducing it to ash, is extremely slow at a temperature of 800°.

Producer Plants and Ammonia Recovery.

In ordinary water-gas plant, ammonia is not found in appreciable quantities, because the deep bed of fuel, necessarily kept at a high temperature during the run, is so destructive of any ammonia formed. The plant which does enable this re-action (essentially by distillation in a current of moist hydrogen) to be utilized for the production of maximum ammonia was described in 1889 by Dr. Ludwig Mond,* and has been developing from that time to the present day, but more particularly during the last ten years. In this plant, where coal is consumed in the producer by blowing with a mixture of air saturated with steam at about 85° C., the coal is, in the first place, at the top of the producer subject to a distillation in a current of gas rich in hydrogen, steam, and nitrogen; and the coke lower in the producer is subjected to the same action, since the oxygen of the blast is used up very quickly. The recovery of ammonia is 60 to 70 per cent. of the total nitrogen, or 90 to 100 lbs. of ammonium sulphate per ton of coal gasified.

The gas made by the process is, of course, not of the same high grade as retort gas, coke-oven gas, or water gas, since the nitrogen in the air used for gasifying is contained in it to the extent of about 44 per cent. It is a producer gas, and its possible value for the carbonizing process is as a heating agent for retorts or ovens. As such, it has undoubted claims; and at Birmingham these claims are at present being investigated by trial on the full working scale. A paper on the subject was read by Mr. Chaney at the last meeting of the Institution of Gas Engineers.*

I do not wish to enter into a discussion of the advantages or disadvantages of heating by external producers; but I do wish to indicate one feature of the Mond, or any other, producer plant working for ammonia recovery, which is likely to become of increasing interest and importance. The modern tendency in construction and working of retort-settings is towards maximum fuel economy, and the effective application of the regenerative principle. The temperatures employed are not too high for the use of continuous regeneration, often known as recuperation, in which no reversals are necessary; but heat is transferred from the flue-gases to the air by directing the two streams of air and flue-gas in opposite directions along passages which lie side by side. Heat is transferred through the separating wall. It is obviously advisable to have as great an area as possible in the separating wall, and as little thickness; and it is also desirable that the passages should be as narrow as practicable, for the following reason: Both flue-gas and air are almost transparent to radiant heat; and so, if a stream of air is to be heated in the very small time that it takes to pass through a regenerator, it must be made to impinge upon the heating surface, and to wash against it as much as is practicable.

There is, however, a great difficulty in the use of narrow passages, which prohibits finesse and complication in the design of regenerators generally; and this arises from their liability to be thrown out of order by fluxing or by choking with dust. This dust comes from the producer-gas used for heating. But if a producer plant is employed for ammonia recovery, the gas is of necessity subjected to a thorough cleansing process. As a result, it can be conveyed in unlined metal pipes, distributed to as many points as is desired, controlled effectively by taps and valves, and carries not a trace of fluxing matter or dust into the setting and regenerators. This is already a matter of importance; and the degree of this importance is likely to increase if higher temperature working becomes more general.

The same considerations apply to coke-oven practice; but I would repeat that it is with the system of continuous regeneration that they become dominant. If the necessity or advisability of heating with clean gas is allowed, then economical working becomes more closely involved with the question of ammonia production from coal, with which I have attempted to deal in this brief address.

* See "Journal of the Society of Chemical Industry," p. 505; and this "Journal," Vol. LIV., p. 407.

* See "Journal," Vol. CXXII., p. 938.

Duty of the Modern Illuminating Engineer.

A few weeks ago, Dr. Edward P. Hyde, of the Physical Laboratory of the National Electric Lamp Association (now the National Lamp Works of the General Electric Company), gave a lecture in New York on "The Progress of the Science of Lighting," in the course of which he made the following remarks: "The duty of the modern illuminating engineer is not merely to compute the foot-candles of illumination on a given test plane, and let it go at that. The goal of illuminating engineering is not the mere computation of foot-candle illumination necessary for vision, the design and application of lamps and reflectors which will give a uniform or non-uniform distribution of illumination, as the exigencies of the case or the whims of the designer may dictate. It is not the cold, calculated plan of illumination which keeps within the bounds of economy, and does not trespass upon those fields implanted by physiological research with the warning sign of 'Dangerous.' The goal of illuminating engineering will have been attained when, as a result of the concomitant development of its component elements, it will be possible, in every case presented, to design a lighting installation which will be efficient, effective, artistic; which will produce an illumination correct in quantity and quality, properly balanced as to high light and shadow, restful to the eye and harmonious with the form and colour scheme involved; which will stand the rigorous test of logical analysis, and will appeal to the most highly developed sense of beauty."

Preventing the Freezing of Water-Pipes.—By keeping currents of several hundred ampères flowing continuously through water-pipes which otherwise would have been in danger of freezing, it was possible to continue construction work on the hydro-electric development of the Cedar Rapids Manufacturing Company, near Quebec, without interruption during even the coldest days of the past winter. The 1-inch pipes thus protected supplied water for the steam shovels and were laid above ground, as continuous shifting prevented them from being buried. Current for the pipe circuits was obtained from a bank of transformers stepping down from 2300 to 220 and 110 volts. The pipe connections consisted of copper wires wound round the ends of the pipes, and buried several feet in the earth to prevent the pipes from freezing below the connections. When the temperature was below zero, and even as low as − 27° Fahr., it was found that 40 kilowatts at 220 volts would keep 1500 feet of 1-inch pipe from freezing, even with water standing in it. A 1000-feet pipe required 20 kilowatts at 110 volts.

SOUTHERN DISTRICT CONFERENCE

OF THE

BRITISH COMMERCIAL GAS ASSOCIATION.—REDHILL, MONDAY, APRIL 27.

THE Southern District Conference of the British Commercial Gas Association was held on Monday of last week, April 27, in the Market Hall, Redhill. The proceedings commenced with the reception of members and visitors by His Worship the Mayor of Reigate, Mr. G. A. R. Ince, J.P., C.C. The chair was taken by Mr. William Lees Stenning, J.P., the Vice-Chairman of the Redhill Gas Company.

The MAYOR, welcoming the members, said the Municipality were always glad to have in their midst people who desired the promotion of all that was good; and he understood that one of the objects of the British Commercial Gas Association was to promote, not only their own respective undertakings, but the more healthful use of gas in all phases. This was quite a good and useful object—apart altogether from the commercial side. He occupied a somewhat anomalous position that afternoon, because, besides being the Mayor of the borough, he happened to be Chairman of the Electric Lighting Committee; so that he figured as one who had been at work for some considerable time in endeavouring to induce the community to adopt other means of lighting, heating, and power than that in which his audience that afternoon were immediately interested. He was glad to be present to offer to the members, in the name of the Corporation of Reigate, a very cordial welcome; and he hoped that their deliberations and the lecture which they and he would have the pleasure of listening to later on in the day would be productive of much good, and that they would go away feeling that the time they had spent in the locality had not been in vain.

Mr. EDWARD ALLEN (Liverpool) proposed a vote of thanks to the Mayor for his presence that day, and for his welcome of the Association to Redhill. He wished to congratulate the Mayor on being the Chief Magistrate of a borough where the rates (including the death rate) were so low; and they would all welcome his presence that afternoon as the Chairman of the Electric Lighting Committee of the Corporation. There was no occasion whatever to think that there was any rivalry in an improper sense between the two important industries. The gas men had great admiration for electrical engineers, who were men of eminence and education in their particular line of engineering, and were doing their best for the people of this country the same as gas engineers were. He would venture to say that gas engineers and gas undertakings existed for the benefit of the people at large—though, of course, it was true the shareholders got a little dividend each half year, which must be the case to meet the expenditure of capital necessary. No commercial undertaking was successful unless it pleased its customers; and looking at the flourishing condition of the gas business, he was glad to know that the public generally were being benefited, and that their lives were made happier by what was being done for them. Gas engineers were quite certain that for lighting, heating, power, as also for cooking purposes, there was nothing like gas; and at the conference later on they would talk about these matters without saying a word about electric lighting—they would simply say that gas was the best thing. The result of the conference would be not alone for the benefit of Redhill but for the whole country.

Mr. H. C. HEAD (Winchester) seconded the vote of thanks. They would all appreciate the public spirit that had brought him there that day to open their conference, and they would congratulate the Directors of the Redhill Gas Company on being up-against so good a sportsman as the Chairman of the Electric Light Committee. If what they had heard from him that day was a sample of his conduct generally, he (Mr. Head) was quite sure that if the Mayor could not live as long as he liked he would be liked as long as he lived.

The motion having been received with acclamation,

The MAYOR returned thanks. It had given him great pleasure to be present and to offer in the name of the Corporation a very cordial and hearty welcome to the town.

THE REDHILL COMPANY'S CHAIRMAN'S SPEECH.

The CHAIRMAN (Mr. Stenning) said he wished to apologize for being in the chair that afternoon. When the Southern District Conference expressed its wish to come to Redhill, the duty of presiding naturally devolved upon the Chairman of the Redhill Gas Company. But, with unnecessary modesty, his colleague, Mr. Hunt, had declined the office. He would not say that he had refused, but he wished not to occupy the chair. The Chairman of the Reigate Company was then asked to preside; but he was unable to do so on account of failing health. In the circumstances, he (Mr. Stenning) had stepped into the breach; and for this reason he would ask them to pardon any shortcomings on his part. He could assure them that his heart was in the gas industry, and that he would do the best he could. It was a great pleasure to the Directors of the Redhill Gas Company to welcome the members to the town. It was no secret that it was their intention in the first place to hold the conference at Reading; but their old friend, Mr. Douglas Helps, was too busy and so had to decline the offer. All he could say was that Reading's loss was Redhill's gain. It was also a great compliment to their Manager, Mr. Bennett.

The name of the Association thoroughly described its objects. It was not a London Association; but an Association of gas industries throughout the whole of the British Empire. They were living in an age of progress and rapid change. The last ten years had shown more changes in their industry and in inventions than any previous period in the history of the country; and he thought the word "Progress" thoroughly well represented the objects of the British Commercial Gas Association. The industry of gas making was associated with almost every undertaking one could think of; but it had made, with other commercial objects, the greatest progress during the last few years. One had only to look upon the mechanical appliances which had recently been invented—such as high-pressure lighting, and development in the use of gas for power, and improvements in every kind of fitting—to see what strides the gas industry had recently made. He was sure that more frequent gatherings together of the managers and engineers in conference must be for the good of the whole industry, and incidentially also for the good of the community at large.

In years gone by, he hoped he was not insulting gas managers when he said they seemed to think that their work had ended when they had supplied a good illuminant, and left the public to do the rest. Business had changed; where it used to come to them automatically, they now had to look for it, and had to study in every way how they could improve the methods of handing over the finished article to their customers. The pioneer work of the Association had really started with the Gas Light and Coke Company; and they were delighted to have present Mr. Goodenough that afternoon. For several years past he believed the Gas Light and Coke Company largely advertised, and in other ways popularized the use of gas; but one Company, however large, could not successfully cope with the whole of the kingdom, and he was sure that the formation of the British Commercial Gas Association, with the different districts spread over the whole of the country, must lead to the development and improvement of its service. When they realized that the work was done at such a very small cost to each undertaking as 2s. 6d. per million of its output, one could not understand how any company or undertaking could remain outside the fold. He did not know whether there were any representatives of non-subscribing companies present that afternoon; but if there were, he hoped that they would go home and report to their directors that they ought not to remain any longer in the cold, because the work that was being done was for all alike. At any rate, they should bear their share of the cost.

In connection with this matter, he should like to say that those companies which had joined the Association had already reaped benefits from publicity and the other help that had been afforded to them. He was authorized by Mr. Bennett to say that since Redhill joined, their business had increased, perhaps not by leaps and bounds, but at a greater rate than it did in previous years. One instance came to his knowledge of a customer who was having difficulties with her cooking apparatus. She applied for the best appliances, and then asked for somebody to show her how they could be worked. The manager reported this to the Association and received such efficient help that the matter had now been put right. This was a small matter; but it was just one instance of the way in which the Association helped. At a time when a change was going on in business of every kind, the Association came forward with the best information and practical advice suitable to every district. No doubt what was suitable for a borough like Redhill would not be at all suitable for a manufacturing district. Therefore, the very fact of the different managers meeting and conferring together was of great assistance. The Southern District represented, he believed, one-third of the total number of members; and as it extended from Southampton to Dover and as far North as Oxford and Bedford, they would appreciate what an important part it bore in the whole Association. He should not forget to mention that it included both of the largest Companies, the Gas Light and Coke Company and the South Metropolitan Gas Company, to say nothing of the Brentford and Croydon Companies. He extended to the members a hearty welcome, and hoped that the outcome of the conference would lead to the great gain of the industry and the community as a whole.

Mr. W. E. PRICE (Hampton Wick) said they had heard that afternoon that Redhill was a progressive town. This could be seen as they passed along the streets, and they were not surprised to hear it. But since they had heard Mr. Stenning's excellent speech, they could well understand why it was that Redhill was such a progressive town. It was due to a very great extent to the manner in which the Gas Company handled its business. He had great pleasure in moving—"That the best thanks of the Association be accorded to Mr. W. Lees Stenning for his address of welcome on behalf of the Redhill Gas Company, and to the Company for their kindness in making such excellent arrangements for the purposes of the conference." It was such confer-

ences as these that popularized gas; and it was such towns as Redhill where the Association would always be welcomed. He was sure that the other towns would take a lesson from Redhill and would be clamouring to have the conference not only once a year but in fact oftener.

Mr. C. V. BENNETT (Herne Bay) seconded the vote of thanks. The address of welcome they had heard from Mr. Stenning showed that he took an intelligent interest in the gas industry and had followed all the movements in connection with it very closely.

The motion having been unanimously accepted,

The CHAIRMAN returned thanks.

ADDRESS BY MR SANDEMAN.

Mr. W. J. SANDEMAN (Croydon) then read the address to the members, as given in last week's issue of the "JOURNAL," p. 255.

Mr. F. W. GOODENOUGH (London) moved a vote of thanks to Mr. Sandeman. He wished in the first place to thank him for his kindly reference to himself and to the Gas Light and Coke Company; and he would like to disclaim the whole of the credit being given to the Company for the start of the British Commercial Gas Association, because it was really due to the action taken by the Southern District Gas Association Commercial Section. The only way in which the Gas Light and Coke Company could be said to have contributed was by doing some of the work that was now being done on a much larger scale by the Association. If he might refer to the address of welcome they had heard from the Mayor, he would say that he thought that it was a particularly appropriate speech to address to a conference of the Commercial Association; and referring to the fact that the Mayor was Chairman of the Electricity Committee, he pointed out that the British Commercial Gas Association always tried to recognize that there was room for both industries in the service of the community. They prided themselves on being a *pro*-gas not an *anti*-electric Association. They did fight when they were attacked sometimes; but their policy was not an aggressive one at all. It was merely a policy of progress with regard to their own commodity. No advertisement issued by the Association ever contained any attack on electricity. It would ill become them to set out on such a campaign; for they had, as the Mayor would be interested to know, among their supporters some of the largest corporations in the country which were owners of their own electric light works—such as Glasgow, Manchester, Bradford, and others. One of the principal objects for which they were striving was the improvement of service to the public. This was a matter that Mr. Edwards would have something to say about in his paper; and therefore he (Mr. Goodenough) would not anticipate him except to say that they were aiming at giving better value to the public. All they would ask of their electrical friends was that the competition should be truly commercial, and that they should not have to fight competition aided by the rates. Each commodity should be made to pay its way; and then they would be quite prepared to hold their own or go down in a fair fight. They highly appreciated the readiness with which Mr. Bennett had fallen in with the suggestion that the conference should be held at Redhill, which was only what those who had any knowledge of his keenness in everything that appertained to the advancement of the gas industry expected of him. He was afraid they would be preaching to absentees that afternoon when they talked about the iniquity of not being members of the British Commercial Gas Association. He did not use the word "iniquity" in the literal sense; but he felt that unless they could persuade directors and committeemen engaged in the gas industry throughout the country that it was to their advantage to join the Association, they did not want them to join at all. He was glad to hear from Mr. Sandeman—though he was not surprised, as they had already heard it from Mr. Stenning—that their undertakings had already definitely benefited by the work of the Association. It was impossible to trace with anything like accuracy the extent of the advantages of the work done by the Association. They could not in any commercial enterprise really tell the effects of advertising except in the general advance of its prosperity. If they were to judge advertisements simply by the direct orders that they got as a consequence, they would condemn advertising as an extravagance, particularly with regard to their own industry. The effect of advertising was subtle, and took a number of years to bear its full fruit. Those of them who advocated the scheme the Association was engaged upon had a large faith in the ultimate value, as distinct from the direct value, of advertising. Mr. Stenning had referred to the Southern Association as containing one-third of the members of the whole body. It was rather that it represented one-third of the total money subscribed. The membership was not strictly in proportion to the money contributed. Mr. Sandeman had so thoroughly dealt with the aims and objects of the Association that nothing remained to him (Mr. Goodenough) to add. He would conclude by thanking him for the trouble that he had taken in preparing the address, which he was sure would not only be of interest to those present that day, but would be of great value when published.

Mr. S. Y. SHOUBRIDGE (Sydenham) seconded the vote. He could thoroughly agree with Mr. Sandeman in his account of the benefits received from membership of the British Commercial Gas Association. Speaking as a representative of not one of the smallest companies in the Southern district, he might say they had found a very marked increase in business—this year particularly. They had had a bigger increase in the output of gas than they had had for several years past; and this increase had not been due to any growth in the district. He attributed it entirely to the advertising that had been carried out by the Association and by themselves with the assistance of the Association. It was a matter of almost daily occurrence now-a-days for customers to come to them with one of the "B.C.G.A." advertisements, inquiring for this or that article. This was not sufficiently appreciated by the small companies; and he must plead that until the last few years he himself had little faith in advertising, but was now entirely converted. Many of the officials of the small companies were still unconverted; and what they wanted to do was to get to work in a missionary fashion among them. Of course, they would not be represented there that afternoon, and the best way was to talk to them about the advantages of membership whenever and wherever they met them. In this way they would increase their membership, and so increase the usefulness of the British Commercial Gas Association.

Mr. GOODENOUGH said he was reminded of a story he had heard the other day about a man who did not believe in the value of advertising. A friend who was tired of hearing him say so, put an advertisement in a paper saying that the doubting gentleman would give 5s. for a cat. Since then the gentleman in question thoroughly believed in advertising, because his premises were alive with cats for days afterwards.

The vote having been carried unanimously,

Mr. SANDEMAN returned thanks. He said he should feel more than repaid for his small efforts if they obtained a few additional subscribers as the result of the Conference.

BUSINESS-BUILDING.

The next item on the *agenda* was the paper by Mr. R. W. EDWARDS, of Aldershot, as given in last week's number of the "JOURNAL," pp. 255-8.

[Mr. Edwards writes to say that there was a clerical error in his paper, which he asks should be corrected. In the first column of p. 258, after giving the gas consumptions before and after the rebates operated, the overall percentage increases should have been stated as 48·64 and 46·88, instead of 67 and 68 respectively.]

DISCUSSION.

Mr. J. R. H. JACOBS (Southampton) said the paper they had just listened to covered a very wide area, right from the retort-house to the last house in the area of supply. His own Company had only within the last four or five years adopted the practice of looking after their customers. Previously their business had automatically increased, without requiring very much effort; and it was not until the Corporation Electric Light Department had adopted a progressive policy that his Company felt called upon to enter into the modern spirit of doing business. The Aldershot consumers seemed to be very well looked after; and they had only one thing to do—that was, when their bill was presented to them, to pay it without grumbling. He would confine his remarks solely to the distribution and sales side of the gas industry. First of all with regard to show-rooms, Mr. Edwards had spoken of the suitability of lady show-room attendants. He (Mr. Jacobs) would like to know what was the nature of their special training, because he could hardly see that a lady attendant was in a position to obtain all the training that was necessary for a first-class show-room attendant. He thought ladies were more in their place as demonstrators. Within the last two years his Company had employed a lady demonstrator who had been of the utmost value to them, not only in giving cooking lectures but in visiting the houses of consumers. It was found that a lady obtained access to a house more readily than a man, because she could get into touch with the lady of the house, who was the most important person to deal with. He was about to ask his own Directors to appoint a second lady demonstrator, because they had plenty of work for her to do. Mr. Edwards had referred to the show-room being the centre of his business, and to the fact that the manager in charge controlled the finances, the staff, and the fitters. He should like Mr. Edwards to give a little further information as to how far the finances went, because he could not quite follow him in what he had said on this point. Then again he asked from what class were the district inspectors drawn, because it was stated in the paper that if a district inspector could not deal with any question before him, it was referred back to headquarters. But surely a district inspector having charge of a show-room should be able to deal with practically everything that came before him in his district. A most important body of employees—namely, the fitters—had not been referred to at all in the paper. The fitters came into touch with all classes of consumers; and it depended very much upon the work they put in in the houses of consumers, and the way it was carried out, as to whether they had satisfied or dissatisfied consumers. Then, again, the collectors were really the outposts of the business; and if they could induce business, so much the better. In his case, they asked the collectors to report to the office anything that came within their province with regard to new houses; but it was to experts in the shape of district inspectors and superintendents to whom they looked to get new business, because it was their duty to see that work was carried out properly. He thought the idea of monthly meetings of the employees was a very good one. The practice had recently been started in Southampton, where they spent a very instructive evening dealing with the subject of hot-water

heaters, &c., and they proposed to carry on the practice during next autumn and winter. There was another point which had recently been taken up, but of which no mention was made in the paper—that was the training of fitters. It must be borne in mind that the coming generation were the men who would get the business in the future; and if gas companies wanted to be as successful in the future as they had been in the past, they must train the rising generation. They had recently started the maintenance business in Southampton; and the only trouble that they had had up to the present was that sufficient qualified men to deal with it could not be found, owing no doubt to the fact that they had been asleep for so long, and that business had come upon them with a rush. It was no use having unqualified men; they had far better leave the work alone altogether than half do it. They were also starting the maintenance of cookers and fires; and only so recently as a fortnight before they had started a house-to-house inspection in the hope of satisfying a great many doubtful consumers who were for ever complaining, not directly, but indirectly to the man in the street as to the insufficient service of gas rendered to them, and they hoped to soon get all their consumers in a much happier frame of mind. They went in for advertising very largely in Southampton. They had even captured the trams belonging to their rivals, the Electricity Committee, who had retaliated within a fortnight by advertising upon the tram tickets. In his district they were faced with very severe competition from the electrical point of view; the price for power being ¾d. a unit, for cooking and heating ½d., and lighting 2½d. to 3d. And then again the Electric Department had taken practically the whole of the public lighting, not giving the Gas Company any chance whatever to compete. In four years they had lost the sale of upwards of 22 million cubic feet, which he estimated to represent about 2000 customers. But, in spite of this—now that they had adopted somewhat progressive lines—they were going ahead. Their show-rooms, which were only opened two-and-a-half years ago, were proving too small; and in the near future they would be opening two other show-rooms in the outlying districts, where they hoped to deal with customers who had to come some distance to their present show-rooms. From an advertising point of view, he thought a well-kept show-room was one of the main assets of any company. They endeavoured as far as they could to make the show-room window at Southampton as attractive as possible—only displaying one class of apparatus at a time, and making frequent changes. Some difficulty had lately been experienced with regard to new houses that had been erected; the builders stating that they were not prepared to carcass any houses, as customers preferred the electric light. In order to meet this difficulty, the Company had carcassed houses at cost price, giving the builders a discount of 50 per cent. if they paid the bill within a month. This idea had met with considerable success. When they had to pay the whole price, the builders did not care to do it. They also gave every customer a free service or else a cooker or a fire and met all liberally with regard to hot water.

Mr. W. H. Bennett (Redhill) said Mr. Jacobs had somewhat cut the ground from under his feet; but there were one or two points he should like to enlarge upon—one being advertising. He need not say that he was very keen on advertising; but there was one method of advertising which his Company had recently taken up that he had not seen adopted in many other neighbourhoods, and that was co-operative local advertising. Adjoining his district on three sides there were Companies whose mains came very close to those of his Company; and he had been able to arrange with these Companies to co-operate in local advertisements, to their mutual advantage. While listening to the paper he could not help thinking that the conditions in Mr. Edwards' district were very similar to those in his own. In his case he had a very scattered neighbourhood to deal with. His output was somewhere about 160 million cubic feet, and they covered over 100 square miles. It would be realized how scattered his district was when he said that the number of consumers per mile of mains did not reach 70; and they did not sell 1,700,000 cubic feet per mile of main. He contemplated opening a show-room at an outlying district, such as Walton-on-the-Hill, which was growing very rapidly; and he would like to hear from Mr. Edwards what size of district could support a show-room. Incidentally, Mr. Edwards had referred to the National Gas Exhibition held last year. Most of the companies represented that afternoon had subscribed to the exhibition, and it would probably bring grief to those who had not done so when he mentioned what happened in his own case. They had subscribed in the usual way, and the orders they took the first week in consequence of the exhibition were enough to pay the whole of their expenses. But, in addition, it had to be borne in mind that the fresh customers obtained in consequence of the exhibition would not be bringing in revenue for one month or for one year, but for all time. Mr. Edwards appeared to be very keen on differential prices; but he wished to put on record the fact that he (Mr. Bennett) was equally strong in opposition. He should like to know whether Mr. Edwards put in free supply pipes for gas fires and cookers as well as fixing discount meters free of cost. It seemed to him that if they put in pipes free of cost for the supply of gas to cookers and fires, and then did not give a preferential rate, they would be putting a big tax on the undertaking—that was to say, if the pipes were paid for out of revenue, they were already being more favourably treated than the ordinary lighting consumer. In addition to this, if they were going to let them have their gas at a very much reduced rate, it seemed to him that they were being treated too handsomely His Company had within the last month announced that the price of gas would be reduced by 2d. per 1000 cubic feet. One consumer wrote to say that he had received notice of a paltry reduction in the price of gas, that his lighting business was practically nothing, but that he was paying some £20 a year for gas for heating and cooking, and he said that because the price for electricity for cooking and heating had been reduced, they ought to still further bring down the price of gas for these purposes in the same proportion—he supposed to something like 8d. or 9d. per 1000 cubic feet. His reply to this gentleman was that as he acknowledged himself that he did not want the gas for lighting (practically the whole of his account was for cooking and heating), therefore, the 2d. reduction would be off gas supplied for these purposes. Mr. Edwards had referred to the quick settlement that accompanied accounts. In his own case they had in existence a system of giving 2½ per cent. discount for one month in certain cases; but he personally was absolutely against this, seeing that 2½ per cent. for one month was 30 per cent. per annum on their money, which was a very high price to pay to get one's account settled promptly. He was told that they had a large number of accounts coming in the first month; but his reply was that a large number of his people would in any circumstances pay in the first month. With regard to differential prices, it seemed to him also that Parliament was opposed to differential rates, because in many Acts a clause would be found to the effect that no discount should be more than 10 per cent. for prompt payment and 15 per cent. for large consumptions. When he took into consideration the number of people who would be deprived of any benefit from a lower price for gas for cooking and heating purposes, simply because they used it for lighting purposes only, he could easily see that they would be getting many letters from those people complaining of being hardly treated.

Mr. W. Titley (Guildford) proposed a vote of thanks to Mr. Edwards for his very useful paper. While listening to the paper he had been struck with the vast improvement in the conditions under which the Aldershot consumers existed as compared with those of thirty years ago when the town was noted for its dark streets, smells of escaping gas, and general complaints from the public. All this had changed for the better under Mr. Edwards' management. There was no doubt, if they desired to be successful, they must have an ample supply of gas at the consumer's premises, of uniformly good quality, and at a reasonable cost. If these conditions were backed-up by an intelligent distribution engineer and staff, they would soon make business. All these conditions existed in Aldershot at the present day; but there was one thing always to be remembered—that when new apparatus had been installed, whether it was a cooker, fire heater, geyser, or what not, they should always follow-up and ascertain whether the consumer understood it, and if it was working properly. If this were done, a continual advertisement would be carried on in the consumer's house. There was a great field before them for instituting hot-water installations by men who thoroughly understood the principle of hot-water supply. Many houses in Guildford were very badly supplied with hot water; and this was due frequently to the system being faulty from the first. It was essential to have fitters who understood the installation of hot-water systems; and then plenty of work would be found for them. Mr. Edwards had referred to the sale of gas at Aldershot for filling balloons, and for dining halls; but it might not be generally known that at the Royal Surrey County Hospital, at Guildford, the whole of the cooking was done by cookers fixed there by the Company's men; and also practically the whole of the cooking at the workhouse was done by gas. Aldershot appeared to be blessed with an up-to-date carbonizing plant; and the gas maker must be an expert engineer. He should like to know what charge Mr. Edwards made for cleaning cookers, and what extra price he charged for broken coke. Further, in his new carbonizing plant did he obtain very much breeze, and what did he get for it per ton? Then, again, he should like to ask what he charged for a 3 lb. tin of sulphate of ammonia; and what he charged per gallon for dehydrated tar.

Mr. C. F. Botley (Hastings) seconded the vote of thanks. Anyone who had had any experience in writing a paper would, he said, know that it required great concentration of effort and expenditure of time to prepare the necessary figures and information. Of course, they all came to the meeting in a critical mood; but at the same time they would strive to be just. They were greatly indebted to any gentleman who devoted his time to affording them an opportunity of shooting at him, and also giving him the benefit of his experience. One thing which had struck him (Mr. Botley) on reading the paper was how differently one district varied from another. He could not imagine in his own particular case anything more unsuitable for his district than what Mr. Edwards found suitable for Aldershot. He had shown that he had given his staff a good lead in enthusiasm, and in being full of thought; and he could only tell him that, with regard to residuals, he might be more fortunate in buying, but he realized a great deal more—he would not mention his figures, because he was ashamed of them. He thought that Mr. Edwards was becoming converted to the policy of one price. In his case they did differentiate between their consumers; they gave their lighting consumer service, and provided apparatus for nominal rent. Sometimes they fixed free fires, which they had to keep in order; and thus the consumers did obtain a differential price. There was a great charm about one price. They would have noticed how their electrical friends

dodged about in their prices; and if they could meet some of their old consumers after they had had their first electric lighting bill they would have a good chance of getting their custom back, because they certainly did not understand these tariffs. As a matter of fact, very often the people who propounded them did not. With one straightforward price, they knew what they were doing. They should treat everybody alike (the good consumer and the poor consumer), charging them all the same price. He would ask Mr. Edwards if he had obtained any parliamentary sanction for the differential prices he gave; and he would also like to know, if he happened to have the figures by him, what was the final result of the rebates that he gave for gas-fires. After all, gas cost so much on the average; and one could not get away from the average system. If a gas undertaking produced so many cubic feet a year, and they cost so much on the average (because no one would imagine that some could be generated at one cost and some at another), and if they sold to some at below the average price they would have to charge others above the average price to make it up. After all said and done, they had to get down to the average price; and if the rebate given operated in such a way that some consumers got their gas below the average price, other consumers had to pay for it, which he did not think was fair. It did not appear to him that Mr. Edwards was up against very severe competition in any part of his district.

Mr. W. E. Price (Hampton Court) said the most difficult task they had to tackle was to increase their business and satisfy their customers at the same time. As Mr. Edwards had so wisely said, the satisfied customer was their best advertisement. The difficulty they would all feel would be in presenting to customers employees and representatives who were a credit to the undertaking sending them out. It was becoming more and more difficult to obtain efficient representatives; and as those whom they employed to the greatest extent were the fitters, they came back to the point that they had been making for a long time past—namely, that they wanted more fitters and men of higher quality. The difficulty was to get anyone who was really able to do anything more than the work he had been taught, and in many cases he was not even able to do this. Mr. Edwards' suggestion, of giving a bonus or a commission to anyone introducing business, he thought was a good one. He knew cases where house agents in a district were very good representatives of a gas company. He told the agents in his district who let especially the smaller houses that he would give them a bonus or commission for every consumer sent along; and it was done by way of a post-card which stated what was the service required and had on it the signature of the would-be customer. When the transaction was brought to a conclusion, the bonus was paid. The point to be aimed at was satisfying the consumer; and they could all do something in this direction by following him up. He was afraid it had been the custom in the past, after the work had been done, to leave the consumer alone, and not ask him if he was satisfied. It was quite a good plan to follow up the work with a system of cards, so as to be sure that the customer was fully satisfied. The inspector would call on him, present to him a card, and politely ask him to sign the card as being satisfied. This practice made the gas company's representatives more energetic when they saw that the cards were examined; and it also had the effect of bringing the matter more seriously to the mind of the consumer when he was asked to put his name to the statement that he was satisfied with the work that had been done. Mr. Edwards had touched upon the question of water heating; but he (Mr. Price) would like to have heard more said about this subject, because they were all at present pressing forward the water-heating business. He thought, in this connection, that inspection was more important than anything else, because if any mistake could be made, or any bungling done by a fitter who was supposed to be a gas-fitter, he would make it on the hot-water heating circulation. One had to be so careful to prevent the fitter connecting gas-heating apparatus on to an old system in which the hot-water tank was nearly the size of the house, with the consequence that when the first quarter's bill was sent in, the consumer was so shocked that he had the circulator immediately taken off. It was far better to deal with the question before the apparatus was fixed. In such a case he thought it was a good plan to send some reliable person round, after a short period, not only to see if the apparatus was in use, but, if it was in use, to ask the consumer if he was satisfied. He personally had found this practice most beneficial. He had found on such occasions that quite a number were not satisfied with the way the apparatus was working; and that it was after all simply a question of adjustment, after which had taken place the consumers had been quite satisfied. The periodical meetings of inspectors and fitters to discuss various subjects was an excellent idea, because these men—especially the inspectors, who had been taken from the ranks of the fitters—were constantly coming up against propositions to which they were strangers. The inspector did his best to deal with a subject; but he (Mr. Price) was afraid in many cases he came across something as to which it would be far better if he said he did not understand it and referred to somebody who did. It brought one back to the old question of the training of fitters. If the authorities that be would turn out fitters in large numbers they could promise them that they would absorb them at a greater rate than they could provide them.

Mr. Edward Allen (Liverpool) desired to emphasize the importance of gas being supplied of consistent composition. It was stated in the paper, and it was worth repeating, that unless they sent out from the works gas of consistent composition the best gas appliances would suffer, and many complaints received from consumers could be traced to the fact that the composition of the gas was not consistent. Many of them were forced to supply gas of a certain illuminating power; and they were sometimes put to very curious shifts to comply with the obligation, because they could supply gas of 20-candle power in a flat-flame burner, of a calorific value of 100 B.Th.U. less than another gas that would equally meet the illuminating power obligations. It would be a very great boon to the gas industry if the result of the various Bills at present before Parliament was that gas should be supplied of one standard, because then they could all fix their minds on this particular standard. There was no doubt at all that they had suffered during the past twelve months in respect to the sale of coke. It had been explained at other conferences, and need not be gone into at the present one; but if every undertaking dealt with its own district in the way that Mr. Edwards was doing, and obtained the full amount of business that was possible in the district, it would lead to improvement all round. Broken coke was necessary for domestic consumption, and facilities should be placed in the way of every consumer obtaining any quantity necessary. The reference that Mr. Edwards had made to the fleet of motor waggons that would be required, was rather startling for the moment. With regard to gas-fitters, he thought they were never better than they were at the present day. This was certainly his experience; and he hoped it was the experience of everybody else. In his case, they had over a hundred gas-fitters who had formed a "Gas-Fitters Guild," which sat frequently. Those who were at the head of the concern were very delighted to be able to assist these gas-fitters in making their guild meetings interesting, by giving short papers, bringing before the meetings special apparatus, lantern-slide lectures, and such-like things. He was very sanguine that the movement that was on foot for the training of boys would enable them to have very much better tradesmen than they had had previously. Then, again, he thought that all gas men ought to recognize the very valuable assistance given to them by the manufacturers of gas appliances. They had been struggling to put the various gas appliances in the hands of the consumer; but they would never have succeeded if it had not been for the assistance afforded by the manufacturers who had shown a spirit of enterprise during the past two or three years which was most admirable. They were trying to meet all the requirements—even of the "Lancet;" and they were looking forward to a time when the mention of a gas-fire or a gas-stove would not cause the most delicate or ignorant lady to turn up her nose.

Mr. H. C. Head (Winchester) thanked Mr. Edwards for the many valuable tips he had given in his paper, Great efforts were being made to educate inspectors. But the representative of a gas company who came most in touch with the consumer was the collector; and so far as he (Mr. Head) could see, no effort was being made to educate him. This man went to every consumer's house once a quarter; and he had the greatest chance of canvassing a consumer. If he had anything interesting to say to the consumer, he could do more to push gas than any number of inspectors. Yet he (the speaker) was afraid that the collector was the most stick-in-the-mud person they had in a gas concern at the present time. In the big companies the collectors were important officials, receiving good salaries—often greater than the inspectors; and he felt that some effort should be made by the heads of the gas companies to see that their collectors became efficient canvassers. With reference to the maintenance of gas-fires, for just over three years every gas-fire sent out by his Company carried with it three years free maintenance. When the term had expired and the consumers were asked if they would go on paying a small sum per quarter for maintenance, with one or two exceptions they asked why they should pay anything, because the fire had never during the three years given any trouble whatever. More whole-hearted testimony to their free maintenance system they could not have. In regard to following up a customer, in his opinion more than half the value of an advertisement was in the following-up process which he was able to put in motion. But it was very difficult to organize such a process, and obtain any information of the results obtained by it. If anyone could afford information with regard to the means that had been adopted of following-up advertisements for the sale of gas or for gas appliances, there would be many besides himself who would be very grateful for it.

Mr. F. W. Goodenough congratulated Mr. Edwards on his paper, and the conference on having such a paper to discuss. Every paper of this description was another nail in the coffin of old-fashioned methods, which he was afraid still existed in far too large a degree in all parts of the country. Such frank confessions as Mr. Jacobs had made with regard to Southampton, and the Gas Light and Coke Company could make with regard to bye-gone days, were all helpful in causing other managers to realize the necessity for abandoning old-fashioned ideas. One thought sometimes that progressive ideas prevailed everywhere; but occasionally evidence to the contrary cropped-up in correspondence that reached the British Commercial Gas Association offices from consumers and managers, showing that the spirit of bye-gone days was by no means dead. It was not uncommon for a consumer to be told that he would get further information if he applied for it. To hear of such an attitude being taken up towards a gas consumer made one's blood run cold. Mr. Head had spoken about the question of following up after gas appliances had been installed. The system that he (Mr. Goodenough) had found work very well was

sending a typed letter to the consumer a month or six weeks after every apparatus had been fixed, inquiring whether it had given satisfaction. When he started doing this some of his colleagues remarked that he was asking for complaints; and his retort was that this was exactly what he wanted. The system had led to their receiving a few complaints; but it had also led to their obtaining a large number of excellent testimonials which had proved of considerable value in canvassing business elsewhere, and it had also led to additional orders from their consumers. As had been remarked, consumers would very readily talk of their complaints; but they were very shy of sitting down and writing about them. Mr. Edwards had referred to his policy of giving equal consideration and attention to the small and the large consumers in his district. This was an absolutely sound policy, as well as sound ethics. He had found that the poor consumer was very frequently an employee of the rich consumer. A year or two ago his Company had had a complaint from a consumer occupying a very small house in one part of their district. He (Mr. Goodenough) saw that the man was being treated with rather scant courtesy because he was a small consumer, and he had the matter dealt with in a proper and liberal spirit. He received a letter from this consumer expressing his complete satisfaction at what had been done for him, and he found out a day or two afterwards that he was the engineer for a consumer in another part of their district paying some £400 a year for gas for power purposes, and where the question of suction gas in place of town gas was just being considered. This small consumer, living in a very small house, had a very big say in the question of whether town gas, as distinguished from suction gas, should be the power adopted. He was glad that he had found this out after he had been treated properly rather than before; but it emphasized to his mind the point that very often the small consumer was the employee of the larger consumer, and that he had in many ways the power of getting back on them if he had not been treated properly. Reference had been made to the difficulty of finding qualified men. He was sure that they all suffered from this, and that they would all take part whenever they could do so in the training of young men to grow up to add to their staff which, owing to the progress of business, was always on the increase. There was another direction in which training was necessary, besides the technical education of the fitter; and that was in commercial education in two commercial principles—the principle that Mr. Edwards had referred to, of good service to the public and always getting at the consumer's point of view, and treating the consumer as the person who paid the dividends and paid the wages and salaries, and not a person to be treated with a supercilious air by a jack-in-office who thought himself a big man because he was an official of a public company. This spirit was fortunately dying out. He was very glad to see Mr. Edwards' reference to collectors. He would not say that he agreed with Mr. Jacobs' view on this point. He thought the collector was a valuable officer for obtaining new business, because he had the personal contact with the consumer that was so valuable. Apart from the question of his canvassing to obtain business, it was very necessary that they should get into the collector's mind the right attitude towards the public, and the proper concilitary and considerate treatment that helped to continue the feeling of satisfaction which the salesman had been trying to create by his efficient apparatus and good maintenance service. If the collector's manners towards a consumer were what they should not be, he could undo a great deal of the good that might have been done by the staff of salesmen. There was another class of employee that had not been mentioned either by Mr. Edwards or in the discussion, and that was the rental clerks and cashiers, the office staff, in contact with whom the consumer came when he called to pay his account. An American once said that he had been connected with 119 gas undertakings in the United States and he had never known one in which the work of the outside staff had not been to some extent discounted by the uncommercial training and the uncommercial attitude of the indoor staff when consumers came to the office to pay accounts or make complaints. It was very necessary that every member of the staff, from the office boy upwards, should be trained in the proper attitude of mind towards the public. He thought a great many managers did not realize that the telephone boy's voice was the voice of the gas undertaking when he had to answer an inquiry. He agreed with Mr. Edwards when he said that the habit of study in catering for the community was a matter of necessity. The monthly meetings of the staff had proved a very great success in the case of the undertaking with which he was connected; and he did not think that these meetings could be held too frequently, in order that the ideas of the men might be pooled, so that the experiences of all might be available for the information of their fellows. These meetings were in the same category as their own Association conferences. They met together to exchange their experiences for the benefit of the industry, in the same way that the staff met together and exchanged their experiences for the benefit of their respective undertakings. He was glad that Mr. Edwards did not put the question of price first in his enumeration of the items that went to make up success in salesmanship, because, as he (the speaker) had said before, he was quite sure that moderate price *plus* good service would sell more gas than a low price *plus* bad service. He knew cases where the price of gas was very low and the service very bad, and the output was not what it might be. Of course, if they had a good service with a lower price they would do better business; but it was far better to spend 2d. per 1000 cubic feet and get good service than to starve the works and service in order to get 1d. or 2d. off the price. He was sorry that the paper did not contain more reference to hot-water supply, as he thought in this they had a big field of industry in front of them. It had only just begun to show itself up above ground; and the harvest that would come later on would be much greater than any of them appreciated. As Mr. Price had said, the training of young men in hot-water supply was of great importance; and he (Mr. Goodenough) knew some undertakings which had meetings of their men every month when one of the articles appearing in the "Bulletin" was read over and discussed. The articles referred to were written by a thoroughly qualified man; but for obvious reasons, as he was connected with a firm of apparatus makers, no name was given. The paper, referring to gas-fires, had said that they must get out of the drawing room into the living room. In his opinion, they would have to be careful about doing this, and should not get into the living room with a gas-fire until they were sure that the consumer could afford to pay for it, unless it would so reduce the labour of the house that the occupier could dispense with a servant. Nothing did gas consumption more harm than putting a gas-fire into a room unless the consumer was aware beforehand what it would cost. They might have ten gas-fires in a house, nine of them only consuming a reasonable quantity of gas, but the tenth might burn as much as the whole nine put together, and that one would be the cause of the whole lot coming out. For the reason that gas-fires were not by any means constantly used in rooms where they were put, he always felt that the policy of free-fitting required to be carried out in a careful and conservative way. It was easy to increase the number of gas-fires in a district by having them put into spare rooms, where they might only be used two or three times in the course of a winter, if they were supplied free of charge; but it might take twenty years of consumption before they got back the cost of fixing. The extent to which a gas-fire was going to be used was a very serious consideration. In his case, they found with stock consumers that it was a very good policy to make a charge for fixing, while no charge was made for rent. If the consumer was not prepared to pay something for fixing the fire, it did not look as if he meant to use it very much. While he (the speaker) was as keen as anybody in seeing an increase in the use of gas-fires, he did not think that free fixing should be indiscriminately adopted anywhere.

Mr. W. M. Mason, the Secretary of the Association, said he had been very much astonished that no reference had been made in the paper to the vast amount of valuable literature which was at the disposal of the members at a very cheap rate. The industry had at its hand absolutely the best literature the profession could produce; yet it was lying idle. Mr. Jacobs knew a little about it, and he had appreciated it; but he (Mr. Mason) thought it was safe to say that at least 90 per cent. of the members did not know what they were able to get for the mere asking. He would invite them as they left the room to see on the table at the entrance hall the literature that could be supplied them, and he hoped that they would not delay to send in their orders.

The vote of thanks was then carried by acclamation.

Mr. Edwards, in acknowledgment of the vote, said that he highly appreciated the criticisms of his paper. He had been reminded by Mr. Jacobs that the electric lighting undertakings had brought them to their senses; and he thought many other gas undertakings if they told the truth would have to admit the same thing. The qualification of show-room attendants had required a certain amount of care and preparation; and he wished to thank Mr. Goodenough for the ready facilities he had offered on a previous occasion by allowing him to send their leading woman to his show-rooms to obtain information and the bed-rock of her knowledge. When a new assistant thought she had grasped the main principles, she was passed to another branch, and so on until she eventually took charge in a superintendent capacity either of a show-room or assisted at the head office. The district inspectors controlled the sale of fittings, coke, tar, and so on—taking the cash and forwarding it to headquarters. It was found that consumers preferred to pay their money at the local show-rooms, and at the same time the lady superintendent took advantage of the occasion to introduce business. With regard to collectors, the discussion had very well answered Mr. Jacobs' questions on the point. Though he (Mr. Edwards) had not mentioned the question of fitters in his paper, he appreciated a trained fitter; and so far as the facilities in his own particular district would admit, they had done all they could to educate the fitter. With regard to carcassing houses, the method he had adopted, when he found the builder was not inclined to do it, was to do it for him, putting in the pipes free of charge. He agreed with Mr. Bennett that it was an excellent arrangement to co-operate in local advertising. When gas companies joined up in this respect, it was an economical way of doing business. With regard to central districts, in his case they had thirty odd districts, in the smallest group of which they sold about 10 million cubic feet, and there they would have a small show-room well equipped. On the question of differential prices he might say that six or seven years ago, at the invitation of the "Journal of Gas Lighting," he prepared an article in which he gave his views on this subject; and he must say that he believed in differential prices where the price of gas was high. It applied particularly on the point where Mr. Goodenough said they should hesitate to introduce a gas-fire into a living room. By offering a differential price—that was to say, taking off so much—they were enabled to obtain business they would not otherwise get until the general price came down to such

a figure that it would prove equally attractive. He did not consider that gas at 3s. or 2s. 6d. was sufficiently attractive to get all the business that could be got in a house. If they could only bring their prices down to something under 2s., there would be no need for differential prices. In such a case he would prefer a flat-rate; but when the price was in the neighbourhood of 3s. or 3s. 6d., differential rates came in very useful for the purpose of increasing business. He wished to thank Mr. Titley for his kind expressions. He had not mentioned hot-water arrangements; but with regard to the promotion of the sale of gas for heating water, no one was keener than he was. All his show rooms were equipped with hot-water geysers, and all their men had been especially educated in fitting them up. He cordially agreed with Mr. Allen's remarks with regard to the assistance rendered by makers of gas apparatus. He thanked Mr. Head for his tip about giving three years free maintenance for a gas-fire; and he had also learnt something from Mr. Goodenough with regard to following up the supply of apparatus. If a rental clerk or cashier in the office did not adopt the same attitude to the public as the other part of the staff, he should want to get quit of him very quickly. It was within his knowledge that rental clerks were inclined to be indifferent; but the same remarks applied to the ordinary collector, who was apt to tell the consumer that any question of the supply of the gas did not concern him, as it was not in his department. In his own case, the collectors did not adopt this attitude; on the contrary they listened sympathetically to anything the consumer might have to say, and reported it to the officer for it to be followed up. He endorsed what Mr. Mason had said with regard to the circulars and other literature at the disposal of members; and, in conclusion, he thanked the members for the discussion that had taken place, which had far exceeded his anticipations.

The Chairman then moved—"That this conference of representatives of gas undertakings in the Southern district heartily approves of the aims, objects, and policy of the British Commercial Gas Association, is of opinion that it should receive the whole-hearted support of every gas undertaking in the district, and appeals to the administrators of the non-subscribing undertakings to join in this national movement for the advancement of the gas industry throughout the British Islands."

Mr. Cyril G. Davis seconded the motion, which was put and carried unanimously.

Mr. Goodenough proposed a vote of thanks to Mr. Lees Stenning for his conduct in the chair, which was received with acclamation.

The Lewes Lecture and a Reception.

At eight o'clock a lecture was delivered in the Market Hall by Professor Vivian B. Lewes, F.C.S., F.I.C., on "The Hygienic Value of Coal Gas as an Illuminant and a Fuel." This was followed by a reception (for conference delegates, and members of educational, medical, sanitary, health, and other local authorities, invited to the lecture by Professor Lewes) to meet the Chairman (Mr. G. R. Hunt) and Directors of the Redhill Gas Company.

During the afternoon's proceedings, the Chairman announced that a telegram had been received from Bailie Paxton, of Glasgow (the President of the Association), regretting his absence, and sending cordial wishes for the success of the gathering.

NORTHERN DISTRICT CONFERENCE

OF THE

BRITISH COMMERCIAL GAS ASSOCIATION.—NEWCASTLE-ON-TYNE, MAY 1.

On Friday afternoon, a Northern District Conference, under the auspices of the British Commercial Gas Association, was held in the Assembly Rooms, Westgate Road, Newcastle-on-Tyne, under the presidency of Alderman Sir William H. Stephenson, D.C.L., Chairman of the Newcastle and Gateshead Gas Company. It attracted a very large attendance of those interested in gas undertakings—directors of gas companies, town councillors of authorities owning gas-works, and gas managers and engineers. The Lord Mayor (Councillor Johnstone Wallace) and the Sheriff (Conncillor Herbert Shaw) attended to welcome the members and friends of the Association. Among others present were Bailie Paxton, of Glasgow (the President of the Association), Mr. Thomas Waddom (the Chairman of the Northern District Conference), Mr. E. F. Hooper (the President of the North of England Gas Managers' Association), and Mr. Herbert Lees, of Hexham (the Secretary of the Northern Conference).

At the opening of the proceedings, the members and visitors received

A Hearty Welcome.

The Lord Mayor said he was there with his colleague the Sheriff to give the Conference a hearty welcome to Newcastle. During the course of their official life, they had to give many welcomes to various bodies; and it afforded them special gratification to have the opportunity of welcoming that afternoon men of light and leading—more especially men of light. The candle makers, at a time before he was born, petitioned His Majesty the King and his Parliament against the introduction of gas, as it was considered that the new illuminant would bring great distress upon them. The petition, however, did not have the desired effect, and gas was introduced. He believed it was in the year 1808 that gas was first made in Mosley Street, Newcastle; and it was rather singular that, during his lifetime, he saw the first incandescent electric lamp in the same street. Some people thought that, just as gas had superseded candles, the electric light would supersede gas; but thanks to the engineers and managers, and the staffs generally, the gas companies had risen superior to the difficulties with which they had had to cope, and had brought gas up to the present state of perfection. It was appropriate he should say that, with regard to gas lighting in Newcastle, the relations of the Corporation with the Newcastle and Gateshead Gas Company had always been of the happiest description; and if other municipalities worked in the same way, he was sure that it would be for the benefit of the community at large. Years ago they used to pay £52 per annum for a 280-candle power lamp; now they got a 300-candle power lamp for £4 3s. He could remember perfectly well when the lamplighter used to run about with his ladder to light the lamps. In those days a man looked after 75 lamps. Nowadays a man could look after 250 lamps, and keep them in repair. More singular still, 5776 lamps could be lighted per minute. This was owing to the new system introduced, called the wave system; and Newcastle, he might add, had been in the forefront with this. He was told that in Newcastle they had the largest installation of pressure-wave lighting in the world. The last two or three years, the candle-power of the lighting in the city had increased from 1,244,346 to 1,444,854 candles—an increase of 18 per cent. Every praise was due to the Gas Company for the efficient state of the city's lighting. He travelled a good deal; and he did not see any better public lighting anywhere. So much for public lighting. With regard to the lighting of private houses, he considered there was equal efficiency; the light being very clear to read by, and equal to, he thought, the electric light. There was one aspect of the gas industry with which he was not satisfied. Nobody appeared to have devoted artistic talent to improve gas-fittings and to make them sufficiently beautiful to be really attractive. Great progress had been made in lighting; and he hoped that in the near future they would have artistic gas-fittings. They were pleased to have the conference in Newcastle; and he hoped the deliberations would meet with the success they deserved.

The Sheriff joined very cordially in the welcome, and said he hoped the visitors would have a pleasant time in Newcastle. The Lord Mayor had referred to the energy and skill displayed by the gas industry in recent years in connection with the organization of the various companies; and he (the Sheriff) believed that a great deal of the success of the gas companies in fighting their competitors was due to the skill and energy and practical way in which they advertised their wares, if he might say so. They had a good example of this in what the Newcastle Gas Company had done recently by establishing an excellent show-room in Northumberland Street, where all sorts of appliances worked by gas could be inspected. It struck him that many of these appliances, notwithstanding what the Lord Mayor had said, were very artistic. Speaking of the enterprise of gas companies, at Aldershot, a military district which was being specially catered for, the Gas Company were able to supply 100,000 cubic feet of gas per hour to inflate balloons and airships, without interfering with the supply necessary for private houses, &c. In addition, the Company were making arrangements to co-operate with the Government for a supply of cooking appliances for the whole army at Aldershot; and they were looking forward to great improvements in this direction. There was one other point he would like to refer to—the question of smoke abatement. The President of the Local Government Board was about to appoint a Departmental Committee to inquire into the subject of smoke abatement; and he believed a gentleman from the Newcastle district would be nominated upon the Committee. He hoped much good work would be accomplished. He learned with some little surprise of the great amount of soot and smoke that was deposited in various forms in Newcastle. They had a soot-gauge in the town; and the report for March taken from the gauge showed that the total deposit in the centre of the city was equal to something like 450 tons per square mile

per annum. The average for the whole town would, of course, be less. If anything could be done by those connected with the gas industry to obviate this heavy deposit of soot, which must seriously influence the health of the people, it would be of great benefit to the community at large.

Alderman L. T. PENMAN (a Director of the Newcastle and Gateshead Gas Company) moved a hearty vote of thanks to the Lord Mayor and the Sheriff for their kind words of welcome.

The proposal was cordially agreed to; and the LORD MAYOR briefly replied.

APOLOGIES FOR ABSENCE.

Mr. W. M. MASON (Secretary of the British Commercial Gas Association) read a number of letters of apology for absence. Among them was one from Mr. F. W. Goodenough (the Chairman of the Executive Council), who spoke of the pleasure he had recently had in welcoming Mr. Waddom (the Chairman of the Northern District Conference) to the Executive. Mr. Edward Allen and Mr. W. Doig Gibb also wrote regretting their inability to be present.

An Address by Sir WILLIAM STEPHENSON.

Sir WILLIAM STEPHENSON said he regretted that there were not present more of his colleagues on the directorate of the Newcastle and Gateshead Gas Company, but explained that most of them were at the moment out of town on business. They had, however, Alderman Penman and Mr. Ritson with them. Before he proceeded any further with his remarks, he would like to give the right hand of fellowship to Bailie Paxton, of Glasgow, the President of the British Commercial Gas Association, whom they were very pleased to see present. Sir William went on to say that he felt personal pride in being assigned the position he occupied that day. It harmonized with the fitness of things that he should preside over them. He was the Chairman of the Newcastle and Gateshead Gas Company, and he was also a Vice-President of the British Commercial Gas Association. Sir William alluded to the National Gas Exhibition in London last October. He visited the exhibition at Shepherd's Bush, and was present at the opening ceremony, when the Lord Mayor of London was there, and the Lord Provosts of Glasgow and Edinburgh, together with other distinguished men from different parts of this and other countries. He had not been more surprised in his life than he was on that occasion to see the equipment and appointments and varied arrangements that could be made for the utilization of gas in the common affairs of life. The Lord Mayor had alluded to the introduction of gas into Newcastle and to the introduction of the incandescent electric light. Well, he (Sir William) was old enough to remember gas being consigned to death, and a decent burial was extended to it, and an obituary was published in regard to it. [Laughter.] But gas still lived; it had risen, Phœnix like, from its ashes, and was more successful to-day than ever it had been, and was likely to be more and more successful as the days came and went. They were to have been killed, but he thought the boot was on the other leg. Let them take Newcastle, and see what happened. The Gas Company was lighting 600,000 people; they were approaching very fast to being the top of the non-municipal undertakings in the country; they were not quite at the top, but very near it. They made last year 3200 million cubic feet of gas, and they carbonized about 300,000 tons of coal. They enjoyed many advantages as a gas company. They were on the great highway of commerce; they could load vessels at their own quay at Redheugh and Elswick with coke for all parts of the world. In the country, Sir William continued, there were 826 statutory gas undertakings, 306 of which were owned by municipalities, and 520 by companies. Although not included in the official returns, there were also from 200 to 300 undertakings supplying gas without possessing statutory powers. The statutory concerns served no less than 6,876,149 consumers, and the gas consumed in 1912 amounted to the enormous total of 198,922 million cubic feet; while 16 million tons of coal, in addition to oil and other fuel, were consumed in the manufacture of this vast production. In the Northern district, which embraced practically the whole of the North of England from Scotland to the Humber, they had 132 statutory and non-statutory gas undertakings, the representatives of which he had pleasure in meeting that day, and the large majority of whom were members of the British Commercial Gas Association. If they were not members, he hoped they soon would be. A conference of this kind afforded an opportunity of discussing matters relating to the commercial side of their work, and of increasing its popularity with the public. He thought it would not be questioned that the gas undertakings of the present day were more solicitous to perform their duty to the public than they were (say) forty or fifty years ago, when no steps were taken to help the consumers by means of advice as to the best and most economical methods of using gas. Sir William remembered taking part in the promotion of a gas company in the early sixties to supply Newcastle with gas, because it was alleged that the old Company were not doing their duty to the public. The new-born Association did, in his opinion, supply the industry with necessary assistance in the work of the undertakings, by means of national publicity, showing the advantages which gas affords the public. He earnestly hoped that the work so well begun would go on, with the whole of the gas manufacturers within the fold, and with increasing influence and usefulness. They aimed at being the envy of their neighbours, and the friends of all who put confidence in them.

Address by Mr. THOMAS WADDOM.

It is fitting, at the commencement of the first district conference of the British Commercial Gas Association held in the North of England, that the objects sought to be obtained by this and the seven or eight others in various parts of the country should be stated, and I do so in the words of the Chairman of the Executive Committee of the Association, as I cannot improve upon the statement he has issued:—

(1) To assist the members and associate members in the work of extending the sales of gas (*a*) by giving them the opportunity of discussing the different ways and means adopted in their various districts, and (*b*) by putting into the minds of boards and committees the need of, and advantages to be gained by, expenditure upon up-to-date local as well as national publicity.

(2) To help the local propaganda by means of popular lectures in connection with the conferences, and by publicity which such meetings and lectures will necessarily promote.

(3) To strengthen the faith of subscribing gas directors and members of gas committees in the work of the Association, and increase their knowledge of the services it is rendering to the industry throughout the country.

(4) To arouse in the minds of the administrators of non-scribing undertakings the feeling that the Association is doing a valuable national work, from which all branches of the industry must benefit, and for which all undertakings should, in their proportion, pay.

(5) To emphasize the fact that the Association is not a London organization, or a South of England organization, but a British organization which, though it necessarily has its headquarters in the Metropolis, is working for the gas industry not only throughout the British Islands, but in a less, though in a well recognized, degree throughout the British Empire.

I am sure you will agree with me that, if these objects are attained, the usefulness of district conferences will be abundantly established; and we in our respective districts will have further opportunities of getting into closer touch with the work of the Association, because it is not always convenient for representatives to attend the annual conferences at a great distance from home.

As there are present here to-day representatives of some of the undertakings that have not as yet seen fit to join the Association, it may be well to restate a few of the reasons for the existence of the Association—its scope and what it is doing.

Those of us who are old enough to remember the gas industry of (say) forty years ago are aware of the great changes that have taken place during this period in the relationship between the gas undertakings and their consumers. Then gas was only used for lighting; now it is used in addition for all purposes for which heat is required—the cooking-stove, the gas-engine, the hot-water supply, and the industrial furnace are only a few of the purposes to which gas has been successfully applied. The activities of the suppliers of gas, which were once of the simplest character, have become an exceedingly difficult problem. The undertakings have to apply themselves to the task of ascertaining the requirements of the public, and must become thoroughly conversant with the character and efficiency of the innumerable types of apparatus requisite to satisfy these requirements. They have likewise to see that such articles are kept in a state of efficiency, and that the consumer obtains the full value of the money he pays for the gas he uses, and must, in short, render to the public an efficient service such as the statutory character of the undertaking suggests that they should do.

Furthermore, it is the duty of the undertaking to educate the public in the advantages to be derived from the uses of gas, and the facilities available for obtaining such advantages. This means that publicity of various descriptions—including the issue of suitable literature—is necessary.

Those who have endeavoured to render such a service as I have here outlined have realized the difficulties accompanying the work, unaided by expert advice and assistance. There are comparatively few who can sit down and readily compose a suitable pamphlet, and fewer still able to design a picture that would draw the attention of anyone except to ridicule the effort. The obvious solution of these difficulties was the establishment of a national central organization; and that, as you know, was accomplished a little over two years ago by the formation of the British Commercial Gas Association with, among other objects, those of assisting subscribing undertakings by providing national schemes of publicity, and carrying out propaganda, in the interests of health and sanitation, among educational, medical, architectural, sanitary, and other authorities, and also Government departments; educative work as to the perfect service of undertakings to consumers; the removal of fallacies as to the character of gas; and, lastly, protection against mis-statements and unfair competition.

The Association is based upon thoroughly co-operative principles; every member being expected to assist the whole industry by the contribution of his advice and experience. The adopted motto of the Association tersely expresses the co-operative principle: "One for all and all for one." The headquarters of the Association is, as it were, the "Clearing House," where the ideas and experience of the whole industry are intended to be pooled and distributed for the mutual benefit of all.

The representation of the interests of the industry is secured by

the subscribing undertakings in each of the districts into which the kingdom is divided appointing representatives who nominate members of the General Committee which meets quarterly, and the Committee then elect an Executive Committee which meets monthly. In addition, there are (very properly) on each Committee representatives of the manufacturers of gas apparatus; and, in justice to that body, I must express the gratitude of the undertakings for the yeoman service they have rendered in bringing apparatus to its present state of completeness. National conferences are held in October of each year. The first was in Manchester; the second in London; and the next will be in Glasgow, under the presidency of Bailie Paxton, whom we are pleased to have with us to-day; and I trust that one will soon be held in Newcastle.

The income of the Association is provided by contributions of the undertakings based upon their respective makes of gas. It works out at about 1d. per consumer. The cost of administration is only 5 per cent. of the expenditure—the remainder goes in the carrying out of the objects of the Association.

That the Association fulfils an acknowledged necessity of the industry is shown by the fact that about 80 per cent. of the gas made in the kingdom is now represented in the Association. We find further evidence in the greater interest and enthusiasm that have been created in our local work during the past two or three years; and that the work of the Association is valuable is proved by the interest which it has aroused on the Continent and in our Colonies. So much is this the case that our last conference was attended by more than fifty gentlemen associated with similar work abroad; and I must particularly mention the United States of America, whence we had Mr. Oscar H. Fogg, and the inspiriting paper he contributed on the occasion for our edification, upon the subject of "American Publicity Methods."

The existence of the Association has undoubtedly been a means of inspiration to the industry in its work, which has already commenced to bear fruit in the form of the extended use of gas. The usual statistics for 1913 not yet being available, I cannot say to what extent this has been the result over the whole country; but I can say that the Newcastle Company had in that year a larger increase over the immediately preceding year than had been the case for the last fourteen years; and notwithstanding our being a colliery neighbourhood with abundant coal, over 3000 additional gas-fires were issued during the year. This I attribute mainly to the influence of the good work of the Association.

Surely the 20 per cent. of our industry unrepresented will soon be convinced of the necessity for completing the unanimous support of the organization that has done so much during its short existence to promote the interests of the industry. I may mention that municipal gas undertakings need not find any difficulty with respect to the dealing of auditors with the contributions to the Association.

The propaganda side of the Association, excellent as it undoubtedly is, will not of itself be sufficient to bring to the undertakings the full measure of success desired—it must be followed up by individual effort if this is to be attained. The seed may be sown and remain dormant for lack of husbandmen to prepare the ground and reap the harvest. The work of the owner of the field is to employ capable husbandmen who will, by continuous effort, keep the field in a fit and proper condition to receive the seed and nourish the plant. To apply the metaphor, the undertaking must, by means of capable assistants, establish a good service to its consumers; supply to them reliable information as to the best and most economical methods of using gas; recommend only the best apparatus, not hesitating to state the limitations to their uses and capacities; and take steps to ascertain and anticipate the needs of its customers and do all in their power to satisfy them. Having prepared the ground in this way and deserved the confidence of the customer, we will receive it; and the fruits of our labour will follow.

Capable assistants must be well trained for the work they have to perform. All new apparatus, before it is offered to the consumer, must be tested to ascertain its merits and defects; and salesmen and fitters should be made acquainted with the information derived from such tests. Literature and statements must be examined before publication, so that the information issued under the authority of the undertaking may be relied upon as being in accordance with its experience; and it must always be borne in mind that the disposal of apparatus is only a means to the end, which is the sale of gas. This end will not be attained by apparatus that does not give satisfaction to the user of it.

One more injunction. Take steps as often as practicable to ascertain if your consumers are satisfied, and if not, find the cause and remedy it.

I would like to say that our northern district, being to a large extent one of an industrial character, there are great opportunities for the use of gaseous fuel. You who are in the midst of it should take steps to bring its possibilities to the notice of manufacturers. Mr. H. M. Thornton's paper at the London conference, and his recent lecture in Newcastle, were exceedingly inspiriting, and will undoubtedly bear fruit.

A word, too, about gas-fires. The public are very much interested in these. The old objections to their use are rapidly disappearing; the faults they had are remedied in modern gas-fires, which are constructed upon principles that have the full approval of scientists and, when properly fixed, have satisfied severe tests of the expert deputed by the "Lancet" to examine and report as to their hygienic efficiency. Professor Vivian Lewes will tell us something about gas-fires this evening; but I would say that the medical profession of Newcastle and district have for years been users of gas-fires. Over thirty years ago the late Dr. Lightfoot had them in almost all the rooms of his residence. Some 88 per cent. of our medical gentlemen use them now, and a leading local surgeon uses them in all the rooms of his nursing home. I think that they are especially suitable in such establishments, if they (as we claim they do) give out only radiant heat; introduce no fumes into the room; enable the temperature of the room to be kept under perfect control; are silent and clean; promote ventilation; and household work is reduced and disturbance of patients in attending to a coal-fire or by the falling of coal and cinders is avoided. If, as is the case, these advantages can be guaranteed, then I submit that the modern gas-fire is the ideal form of artificial heating for the sick room; and we should be prepared to supply such a fire to any medical practitioner, for we all recognize the value of the good word of the doctor, and have a wholesome dread of his condemnation.

Mr. T. W. Wallis (South Shields) moved a hearty vote of thanks to Mr. Waddom for his address; and the motion having been seconded by Mr. E. F. Hooper (Sunderland), it was carried with enthusiasm.

THE RELATIONS OF GAS UNDERTAKINGS WITH THE RATEPAYERS.

Paper read by Harold E. Bloor, B.Sc., of York.

The subject of my paper is "The Relations of Gas Undertakings with the Ratepayers." The relations of gas companies with their respective local authorities are simple, where electricity also is supplied by a company. The company will doubtless be regarded as a trading concern which should be judged according to the value of the service rendered by it to the public. Such service will be judged mainly by the relative cheapness of the supply of gas, and to a less extent by its apparent quality, and by the facilities given for the adoption and use of gas appliances of general utility and demand.

Recognition of the fact that vexatious restrictions of the company's operations will react directly on the majority of the citizens through the price of gas will be general. Councillors will individually and collectively assume the attitude of guardians of the interests of the gas consumers—a term which will be regarded by them as almost synonymous with "ratepayers."

The cheapness and quality of gas and the facilities afforded for its use will be regarded as matters of extreme importance and concern to the entire community, and rightly so. In all probability it is a correct assumption that in such cases the relations of the ratepayers and their elected representatives with the gas company will be substantially as they were before the advent of electricity supply. Gas will, in fact, be regarded as an essential to the comfort and prosperity of society, and as only less in importance than water supply and sanitation.

None present will desire to challenge the accuracy of this point of view; and a moment's consideration of the matter provides overwhelming proof of its soundness. Even if for the moment we accept the prognostication of the most ardent and optimistic advocate of electricity, and assume the eventual doom of gas as an illuminant, we must believe that gas will remain the light of the majority for many years to come. The need for artificial light is obvious; and it follows that a cheap supply of gas will be a boon to the majority, and should therefore be facilitated in every way by their representatives.

There is one ground only upon which this conclusion could be resisted. If the use of gas for lighting were shown to be unhealthy, and a healthy alternative were available, then it would be defensible to hamper its use by every possible means, and to encourage its substitute to the utmost. Our competitors never weary of repeating the charge that "gas is unhealthy." I claim that the refutation of the charge is to be found in experience.

For a hundred years gas has been used in ever-increasing quantity for lighting. It is difficult, if not impossible, to form a reliable estimate of the present annual consumption for this purpose; but the number of gas consumers in the British Isles alone, according to the latest available Board of Trade returns, was 6,650,000, and a moderate estimate of the number of adult persons using gaslight daily is 13,300,000, and their experience will generally cover their entire lives. If we add to these living the earlier users during a period of a hundred years, the whole mass of experience is colossal.

In spite of the unlimited data which must be available, the writer is familiar with no attempt to prove by logical analysis that the use of gas has been injurious to public health. In the absence of evidence to the contrary, it is permissible to assume that the accumulated experience of generations is entirely on the side of gas in this matter; and the onus of proof must thus remain with our opponents who have so far failed to provide "a case for the jury."

From the point of view of the pure publicist, it follows that we are justified in claiming that there is no ground upon which the use of gas for domestic and other lighting should be restricted. Our claim for consideration as a prime necessity of modern life is probably confined to the lighting portion of our load, but our industry has undoubtedly contributed to the health and comfort of "the million" through the medium of gas cooking appliances,

which by their simplicity and economy have placed properly cooked food within the reach of countless thousands. In addition, the use of gas for cooking and heating purposes has contributed more than any other agency to the reduction of the smoke nuisance; and it may yet be found that in this circumstance lies the greatest debt of mankind to our industry.

Those desiring and expecting the total abolition of gas manufacture may in conclusion be asked to picture the effect of the disappearance of gas coke and the loss of ammonia and tar products now produced as bye-products in our works.

To my hearers it may seem unnecessary thus to defend the mere existence of gas; but in my opinion it is desirable to do so, if only by reason of the attitude so frequently adopted towards gas companies in towns where the supply of electricity is in the hands of the municipal authorities. Buying-out a prosperous and well-established gas company has frequently proved an expensive process; but there is no doubt that the uniform success which has apparently attended corporation management of gas undertakings, is at least partially responsible for the general anxiety shown by local authorities to secure control of the electricity supply in its early stages. The dangers and difficulties of embarking upon the initiation of the new industry were generally underestimated, and the era of "rates in aid" has not even yet wholly passed away.

It is impossible to avoid feeling some sympathy with conscientious members of a town council administering an unremunerative electrical undertaking. As the elected representatives of the ratepayers, their clear duty is to safeguard the interests of the latter. In carrying out this duty, they have pledged the credit of their constituents for the purpose of financing an electrical department, and have justified their action to the best of their ability, no doubt revealing in the process a sincere and earnest faith in the future of the business as a profit earner. In the meantime, however, the undertaking has proved mainly a very capable swallower of capital, while the great majority of the citizens have been under the painful necessity of paying a portion of the electricity bills of a small and relatively rich minority who have taken up the new illuminant. It is not to be wondered at if in such circumstances councillors become ardent advocates of electricity for street lighting and all other illumination which they control, or which is controlled by allied public bodies; and as man is always drawn to anything he fights for, we have a complete explanation of the enthusiasm for electricity of electricity committees in particular and municipal councillors in general.

What of the gas undertaking meanwhile? As a whole-hearted believer in the value of gas, the writer is of opinion that the greatest service so far rendered to the public by electricity has been the salutary effect which its competition has produced on the administration of gas undertakings.

Coincident with the introduction of a competitor for our lighting load came the incandescent mantle; and thus a double assault was delivered on what was the great bulk of our business. The effect of the loss of consumption which followed has been obscured by the fact that the field of the slot-meter consumer remained to to be exploited. The great success of this form of supply, and the part played in the success by the provision of gas cooking appliances free of direct hire, enabled gas undertakings generally, even in non-expanding districts, to maintain and even greatly increase their output.

It was, nevertheless, natural and inevitable that the advent of a serious competitor for the main portion of our business should result in recognition of the fact that the gas industry occupied the position of a gigantic edifice on a narrow foundation, and in strenuous endeavours to widen the basis of consumption. The granting of special facilities for the use of gas for cooking, heating, hot-water supply, power, industrial heating, &c., necessarily followed this broadened outlook, while realization of the prime importance of low cost in encouraging development of the non-lighting load was equally inevitable. From this sprang alike the universal striving to produce cheap gas on the one hand, and to improve the number and efficiency of gas appliances on the other.

The ground has proved rich beyond expectation. A noble harvest has already been reaped; and, fertilized with the new spirit which is crystallized in our Association, we look forward to still greater and more abundant results in the future. Our industry has been through the fire, and has emerged unscathed in the flesh, and immeasurably purified and ennobled in the spirit.

It is not claimed that our business is conducted on a basis of pure altruism; but we do believe that gas administration is now permeated throughout with a high conception of the duty of public service. Cheap light and well-cooked food for the multitude, increased comfort and leisure for the overburdened housewife; greater economy and cleanliness in the factory, and a profound effect upon the public health by a reduction of the smoke nuisance, are objects quite worthy the attention of social workers. They are now constantly in the minds of gas administrators; and this fact lends conviction to their publicity work, and will in the fulness of time reap its proper reward in the confidence and esteem of our consumers, and in increased or prolonged material prosperity.

Imperial Parliament, acting with a view to the benefit of the community at large, has indeed seen fit in many cases to establish the price of gas as a measure of the public service rendered by gas companies, and has ordained that the remuneration of shareholders in the form of dividend shall be determined by this measure. How admirably the system serves the purpose for which it was designed, will be known to all my hearers. The attitude of mind which it engenders in those working under it, to their privileges and responsibilities, is illustrated by every line of the address of Sir Corbet Woodall at the inaugural meeting of our Association at Manchester, from which I venture to quote one passage.

> "Whether you are a sliding-scale company or a maximum-dividend company, or a municipal undertaking, the public rights you possess impose upon you a public duty—that of supplying gas in your district at the lowest possible price consonant with your other obligations."

Extension of the Sliding-Scale Principle to Municipalities.

How far-reaching would be the effect of a general application of this principle to public service, if, for instance, the wages of colliers, and the dividends of colliery proprietors were proportioned to the cheapness of coal and not to its dearness! Such a revolutionary idea is doubtless outside the bounds of possibility at present; but the main object of my paper is to advocate the universal extension of the sliding-scale system—the principle of remuneration in proportion to service rendered—to municipally controlled gas undertakings.

At the time when this idea presented itself to me, I was aware of only one case in which Parliament had endeavoured to regulate in this manner the relations of ratepayer gas administrators with their consumers. The intention of Parliament was that one-half of the annual surplus should be used for reducing the price of gas, and the other half only be available for rate-aid. If carried out fully, this arrangement would have ultimately resulted either in reducing contributions to rates to very small dimensions or their total extinction. Either conclusion was equally distasteful to the council concerned, and a very simple expedient wholly stultified the Act. By adding 3d. per 1000 cubic feet to the nominal price of gas, and deducting the amount in making out the accounts as "Contribution from Reduction of Price Account," two purposes were served.

On the one hand, the unsuspecting consumer was caused to believe that he was obtaining a real rebate from his account, and, on the other, the entire gas profits become available for rates. There was no expert and independent body to watch the interests of the gas consumers, as such, and so far as they were concerned the clause might as well not have existed. I have lately ascertained that in a few other cases Parliament imposed similar clauses on municipal gas undertakings, with a view to the protection of the consumer.

Employment of gas profits in aid of rates has become an established practice; and for reasons which appear conclusive, it is not my intention to advocate its total abolition. In sanctioning municipal control of public services—such as gas, electricity, water supply, &c.—Parliament has always acted in the interests of the user, and has in many cases expressly stipulated that the whole revenues shall be employed for his benefit.

In the case of water supply, I see no reason to object to this; but experience has shown conclusively that, in order to ensure proper enterprise in the adoption of economical systems of manufacture and the most profitable commercial methods, it is essential, in so complicated an industry as that in which we are engaged, to provide some inducement to continued effort on the part of the undertakers. It is unnecessary to defend this conclusion, for it has been approved by Parliament in passing the Act of every sliding-scale gas company.

Municipal councillors are not remunerated, but fortunately are always anxious either to reduce rates or to find money for social schemes in which they are interested. To permit the use of gas profits in aid of rates in proportion to the efficiency of service rendered seems the sole available means of procuring the proper attention of the representative of the ratepayer to the interests of gas consumers; and I propose that his anxiety to secure money without any direct call on the rates be employed accordingly.

Approaching the problem of formulating a sliding-scale scheme capable of being applied to all municipal gas undertakings, I premise as follows:

(1) Gas is an essential public service, administering to the health and comfort of society, and as such should be free of special taxes.

(2) The administration is in the hands of the ratepayers, whose interests in the disposal of surplus gas revenue are diametrically opposed to those of the gas consumers.

(3) The ratepayer *per se* should be remunerated for his services to the gas consumer *per se*, and in such a manner as will ensure the maximum of advantage to the latter.

As to the first of my premises. The one-time tax upon glass windows has been condemned by a more enlightened age as an absurd tax on public health and comfort. I suggest that the taxing of gas by excessive contributions to rates belongs to the same order of proceeding, and is equally indefensible.

As to the second. The statement often made by advocates of such contributions to rates, that the whole body of gas consumers are in effect the "ratepayers," and that the matter is therefore of no consequence, is untrue in substance and in fact.

(*a*) There is in every town a proportion of ratepayers who are not users of gas. Some are users of electricity who benefit, or have benefited, by contributions to their bills from the rates, and therefore from the pockets of the gas consumers—directly as

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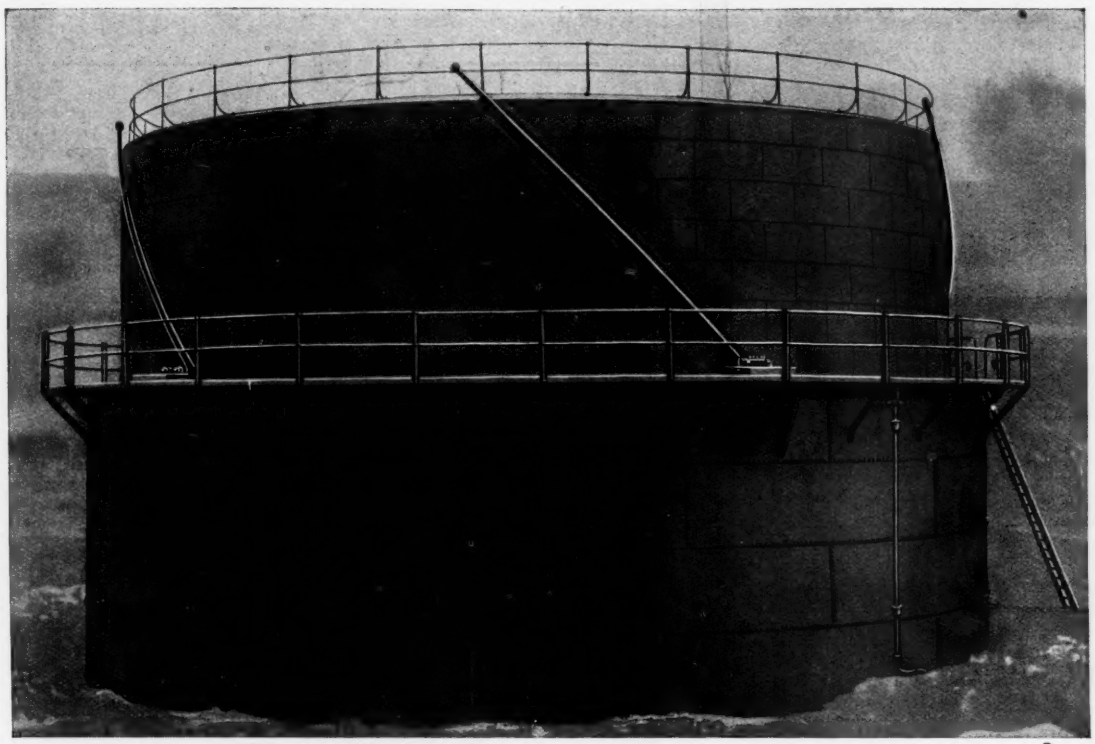

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ratepayers, and indirectly through the price of gas, the latter including rates on the gas-works, and profits in aid of rates.

(*b*) Even if all ratepayers were gas consumers, the fact would provide no answer unless they consumed gas in proportion to rateable value, which is not even approximately the case.

As regards the third. Money is borrowed for municipal gas undertakings on the security of the rates, and the duties of directors are performed gratuitously. It is desirable that the method of stating the contribution to rates be easily understood by the general public; and a payment "per 1000 cubic feet sold" is therefore preferred to one expressed as a percentage of the total or outstanding capital. I assume that 1d. per 1000 cubic feet sold is fully equal to the value of these services, and accordingly propose that such a contribution in aid of rates be taken as the standard contribution in all cases.

Proposed Sliding-Scale of Contribution to Rates by Municipal Gas Undertakings.

Local conditions vary to so great an extent that the absolute price of gas is useless as an indication of the efficiency of the management of any gas undertaking. I propose that progress during a period of years should be the measure of efficiency.

Methods and ideas of prime importance in the economy of manufacture and technique of commercial development, now established by the consensus of opinion in our profession, and forming part of the technical equipment of gas engineers in general, have passed through the stage of controversy or experiment during the past ten years. I accordingly suggest that the price ruling in the financial year 1903-4—be adopted as the standard price for all municipal undertakings.

In order to deal with particular and exceptional cases, the Local Government Board might have power to alter the basis-year for good reason shown.

With a view to ascertaining the actual progress since the year proposed, 69 undertakings were circularized, and the following information obtained for the years 1903-4, 1908-9, and 1912-3.

1.—Gas sold to private consumers.
2.—Profits paid to rates.
3.—Capital outstanding.
4.—Price of gas.

"Profits paid to Rates" were then calculated as pence per 1000 cubic feet of gas sold and as a percentage on the outstanding capital.

Price of Gas.

Reductions of price as between the years 1903-4 and 1912-13 took place in 55 cases, and ranged from 1d. to 1s. 3d. per 1000 cubic feet; 19 reductions were 3d. or less; 21 were from 3d. to 6d.; and 10 were from 6d. to 9d. per 1000 cubic feet. In two cases only did the price show an advance.

Payments to Rates.

In 16 cases no payments were made to the rates in any of the three years; and of these 12 were in Scotland. It is assumed that in those cases such payments are disapproved. There was one instance of rate aid to the gas undertaking, and 137 payments in aid of rates. Details of the latter are as follows:

Less than	1d.	per 1000 cubic feet			14
1d.	to 2d.	,,	,,		21
2d.	to 3d.	,,	,,		29
3d.	to 4d.	,,	,,		25
4d.	to 5d.	,,	,,		21
5d.	to 6d.	,,	,,		9
6d.	to 7d.	,,	,,		11
7d.	to 8d.	,,	,,		4
8d.	to 9d.	,,	,,		2
10d.	to 11d.	,,	,,		1
Total					137

The highest average contribution for the three years was 6·80d. per 1000 cubic feet. Profits to rates calculated as percentage of the outstanding capital revealed some remarkable figures; the maximum contribution being equal to 47·35 per cent. It is clear that a contribution on this basis would be an incentive to capital expenditure.

Taking the maximum reduction of price, of 1s. 3d. per 1000 cubic feet, I suggest that this should entitle to a contribution of 4d. per 1000 feet to rates—or 3d. more than the standard contribution of 1d. per 1000 cubic feet. The contribution payable in any case would thus be as follows: 1d. per 1000 cubic feet, *plus* one-fifth of 1d. per 1000 cubic feet for each complete 1d. per 1000 cubic feet reduction in the price of gas since 1903-4.

The following shows the reductions made, and the contributions which would have been payable in 1912-3 by the undertakings covered by the inquiry under this scale:

Reductions per 1000 Cubic Feet.	Number.	Contribution Permissible per 1000 Cubic Feet.
No reduction	12	1·0d.
1d.	3	1·2d.
2d.	6	1·4d.
3d.	10	1·6d.
4d.	4	1·8d.
5d.	10	2·0d.
6d.	7	2·2d.
7d.	4	2·4d.
8d.	3	2·6d.
9d.	3	2·8d.
10d.	2	3·0d.
12d.	1	3·4d.
14d.	1	3·8d.
15d.	1	4·0d.

In two cases the price was increased; and if the scale operated both ways the position would be as follows:

Increase per 1000 Cubic Feet.	Number.	Contribution Permissible per 1000 Cubic Feet.
1d.	1	0·8d.
5d.	1	*Nil*

As compared with the above, there were in 1912-3 no less than 20 undertakings covered by the return which paid 4d. or more per 1000 cubic feet to the rates, and a similar number made no contribution.

Before concluding I would like to refer to my application of the word "apparent" earlier in this paper, to the success of municipal gas undertakings. It is always a little difficult to define what is meant by "success;" but regarding the work of a board of directors working under the sliding-scale or to their chief officials, it would certainly imply, *inter alia*, the maintenance of a high, or the payment of a higher, rate of dividend which would involve cheap or cheaper service for their customers as an essential preliminary. Municipal management of trading concerns suffers from false criteria of success; and in the case of gas undertakings it is beyond dispute that the production of a handsome surplus for the rates is sometimes all that is asked for by the council as a body. It is in the sincere belief that the imposition by Statute of a legitimate criterion of management upon municipal gas undertakings would be a powerful instrument in promoting the public welfare, that the writer has put forward his proposal.

Alderman W. J. Stewart (Darlington) proposed a vote of thanks to Mr. Bloor.

Mr. R. Watson (Doncaster) seconded. He thought Mr. Bloor's contribution was distinctly aimed at endeavouring, so far as municipalities were concerned as gas administrators, to give better service to their consumers. The scheme of limitation of profits was to give more money to gas committees, and devote it, not merely to reducing the price of gas, but to securing more efficient service. The conditions of a municipality were unlike those of a company. The company had to provide dividends, which must be more or less of a definite figure; while the desire in municipal ownership usually was that the balance of profit should go towards reducing the rates. It would seem that there should be some definite limit of the latter profits. He agreed with Mr. Bloor that they were entitled to some proportion of profit, so as to enable the consumer to get a benefit. As to whether the basic principle of Mr. Bloor's suggestion was the correct one, was difficult to say. The conditions in municipal undertakings were not all alike.

The resolution was agreed to, and discussion on the paper followed.

DISCUSSION.

Mr. W. Hardie (Tynemouth) said the subject dealt with by Mr. Bloor had interest for them all, whether they were gas managers or town councillors who had to do with gas undertakings. The progress of the gas industry had been general. So far as Tynemouth was concerned, there had been an increase in the past thirty years, and the last few years the improvement had been greater than ever before. They had been constantly widening the foundation of their industry, and the gas industry must now be looked upon as one of the great public services of any municipality. He thought that, as the municipality invested money and risked it for the undertaking, it was entitled to some small acknowledgment in consideration thereof. If a standard of 1d. per 1000 cubic feet was equal to the services rendered by the directors, then an amount of that kind might, he thought, be fairly charged against the undertaking,

Mr. Dru Drury (Sunderland), speaking as an official of a company, said it seemed to him it would be rather difficult to fix a date from which they could compare results. Generally it seemed to him that the subject was hardly within the scope of the Association to speak with a united voice.

Bailie Paxton (Glasgow) said he would tell them what had been done in his city. Their revenue from the gas undertaking last year was £1,220,000—almost exactly the number of their population. About four years ago they went to Parliament. Prior to that time they used their profits for the relief of the rates. They had 19 Acts of Parliament that had been created from time to time since 1869, when the Corporation of Glasgow acquired the gas undertakings then existing. They went to Parliament to ask them to consolidate all the 19 Acts, and place them in one Act containing a clause stating that in no circumstances could the profits of the gas undertaking be used for the relief of rates. Therefore what they had to do with the money was to reduce the price of gas, and thus give it to the consumers of gas.

Mr. F. P. Tarratt (Darlington) spoke of those who took the view that municipal undertakings were entitled to expect a fair return for the capital invested. He, personally, thought that the question would be ultimately solved by Parliament itself.

Councillor Seaton Leng (Darlington) said that the municipal undertakings in Darlington did well, and so their rates were low. There was one thing, however, they were sore about, and that was, they paid meter-rents.

Mr. W. M. Mason suggested that the discussion should not be confined to a study of the rates, but that they should turn their attention to the still more important point—the service of the public.

In a facetious way, the Secretary emphasized the value of advertisement by means of lectures and by literature.

Alderman PENMAN said the gas consumers had been benefited by the appearance of the electric lighting companies. The progress of gas had been greater since electric light had been introduced than ever it had been before. The Town Council in which he had occupied a seat for forty years were not at all jealous of his appointment as a Director of the Newcastle and Gateshead Gas Company. On the other hand, if anything required to be done in connection with the Gas Company, they usually put him on the deputation. He thought, when corporations entered upon commercial undertakings, there was a tendency for their primary duties to be scamped. There was great danger of organized interference by corporation workmen at election times. He knew what it was in the old school board days. The active interest of the teachers and their friends controlled the elections. In his opinion employees of corporations should not vote in the appointment of the committees who had to manage their undertakings.

Mr. HERBERT LEES having spoken,

Mr. BLOOR replied to the discussion, and said he hoped the suggestion he had made would receive some consideration at the hands of municipal administrators. He went on to deal with points raised in the discussion. In answer to Mr. Hardie, he said he could not suggest a particular year for all cases of comparison. The point was that, the absolute price of gas not being a criterion of service to the public, some other criterion must be taken. He proposed that, taking some period—ten, or fifteen, or twenty years—in which material development in technical control and commercial methods had taken place, the progress which it was possible to make during this period should be taken as the criterion of efficiency and management for municipal undertakings. The expression, capital invested in municipal gas undertakings had been mentioned; but Mr. Bloor pointed out that the ratepayers had not a farthing invested in gas undertakings. They borrowed money from other people to put into the undertakings. The spirit of his paper was limitation in some way of taking profits to relieve the rates. Some sort of restriction should be adopted by Parliament and imposed on municipal authorities.

A RESOLUTION.

Mr. A. PROCTOR (Chairman of the York Gas Company) moved the following resolution: "That this conference of representatives of gas undertakings in the Northern District heartily approves of the aims, objects, and policy of the British Commercial Gas Association, is of opinion that it should receive the whole-hearted support of every gas undertaking in the district, and appeals to the administrators of the non-subscribing undertakings to join in this national movement for the advancement of the gas industry throughout the British Islands."

Mr. FRASER (Alnwick) seconded; and it was agreed to.

THANKS TO THE CHAIRMAN.

Bailie PAXTON moved, and Mr. W. D. HELPS (Leeds) seconded, a vote of thanks to Sir William Stephenson for presiding; and it was carried with acclamation.

THE EVENING PROGRAMME.

In the evening, there was exhibited a specially prepared cinematograph film, by the Newcastle and Gateshead Gas Company, illustrating the winning of coal and the manufacture and use of gas.

Professor VIVIAN B. LEWES, F.I.C., F.C.S., afterwards gave his lecture on the "Hygienic Value of Coal Gas as an Illuminant and a Fuel." There were about 600 people present, representing the commercial, civic, and scholastic life of the city.

The day's proceedings, which were very successful, concluded with a *conversazione* at which the President of the Conference, Sir William Stephenson, and the Misses Stephenson received the Lord Mayor and Lady Mayoress, the Sheriff and Mrs. Shaw, and a large company of invited guests.

ANALYZING GAS WITH THE BUNTE BURETTE.

A recent number of the "Journal des Usines à Gaz" contained an article by M. Ch. Ab-der-Halden, the Engineer-Chemist of the Continental Union Gas Company, on the subject of the analysis of illuminating gas by means of the Bunte burette. At the outset he referred to the various notes presented to the Paris Academy of Sciences by MM. Lebeau and Damiens describing a new method of analyzing complex gaseous mixtures containing homologous hydrocarbons of one and the same series. Some of the communications of the above-named investigators have been noticed in the "JOURNAL." The new method referred to, which is based upon the employment of the low temperatures produced by liquid air, allows of the splitting-up of the complex mixture into more simple mixtures, upon which the eudiometric analysis may be employed with success. It was applied by the authors to the analysis of three samples of illuminating gas drawn from different sources; and the results showed clearly the existence of the higher homologues of methane and ethylene which had not previously been in evidence. On the subject of the proportion of carbonic oxide in gas, MM. Lebeau and Damiens said it was interesting to remark that this was smaller than was generally supposed, and it was attributable to the fact that the estimation of this compound is made in mixtures of gas which have no action on the cuprous reagent. Admitting an average proportion of 6 to 8 per cent. of carbonic oxide, M. Ab-der-Halden set himself to ascertain whether the action of the cuprous chloride in hydrochloric solution would bring about the absorption of other gases than carbonic oxide.

In order to determine the probable action of protochloride of copper upon methane and its homologues, M. Ab-der-Halden agitated a determined quantity of this reagent upon a mixture of inert gas and gas to be tested, under conditions approaching as closely as possible those of an ordinary analysis. He first of all endeavoured to ascertain the quantity of cuprous chloride necessary for the absorption of a given volume of carbonic oxide in a stated time; and, after several trials, he found that 30 c.c. was sufficient to absorb, in five minutes, from 6 to 7 per cent. of dilute carbonic oxide in an inert gas.

With the view of determining the action of cuprous chloride upon methane, M. Ab-der-Halden prepared a mixture of this gas and nitrogen, containing about 30 per cent. of the former. He then, five times in succession, introduced 30 c.c. of cuprous chloride, which was kept in contact for five minutes, and noted the contraction after each addition. The results showed that methane is certainly absorbed by cuprous chloride in hydrochloric solution.

The analyses made by MM. Lebeau and Damiens show that, besides methane, illuminating gas contains a notable proportion of the higher homologues of this hydrocarbon (ethane, propane, and butane), amounting to 1 per cent. M. Ab-der-Halden was consequently led to repeat upon pure ethane the tests he had made upon methane. He prepared a mixture of ethane and nitrogen, and submitted it to the action of cuprous chloride under similar conditions to those of the preceding experiment. The results showed that absorption, which is only slight in the case of methane, was considerable with ethane. Proof was likewise afforded that the solubility of hydrocarbons saturated in cuprous chloride increases with their molecular weight, and it is pretty nearly certain propane and butane are still more soluble.

To sum up, M. Ab-der-Halden thinks it may be admitted that the small quantity of propane and butane contained in illuminating gas is entirely absorbed by cuprous chloride, and counts, with a small fraction of methane, as carbonic oxide. This solubility of the saturated hydrocarbons is manifested in a very appreciable degree in the ordinary analysis of gas.

The conclusion arrived at by the writer is that the determination of carbonic oxide by cuprous chloride may give rise to considerable divergencies, according to the analytical method employed, and even to the operator. It is, therefore, preferable to have recourse to eudiometric methods of ascertaining the quantity of this constituent in gas, as the oxide is burnt with the methane and the hydrogen, and valued according to the quantity of oxygen employed in combustion. In order to ascertain the extent of the divergencies referred to, the author compared the compositions of two samples of Paris gas as shown by the ordinary method, in which the carbonic oxide is absorbed, and by the eudiometric method, in which it is burnt. The following were the results:

	Ordinary Method. Per Cent.		Eudiometric Method. Per Cent.
Carbonic acid	1·6	..	1·6
Oxygen	0·7	..	0·8
Unsaturated hydrocarbons	3·4	..	3·4
Carbonic oxide	8·4	..	5·1
Methane	28·3	..	30·6
Hydrogen	53·1	..	53·5
Nitrogen	4·5	..	5·0
	100·0	..	100·0

Comparison of these results shows that the apparent increase in the proportion of carbonic oxide coincides with an apparent diminution in the quantity of methane. Numerous analyses proved to the author that the actual quantity of carbonic oxide fluctuates between 5 and 5·5 per cent., and that this proportion ought to be regarded as an average, at least for Paris gas. In certain contracts drawn up by municipal authorities a maximum proportion of carbonic oxide, as determined by the Bunte burette, is specified. M. Ab-der-Halden thinks the conditions under which the determination is carried out should be laid down, and a certain allowance made in proportion to the inexactitude of the method.

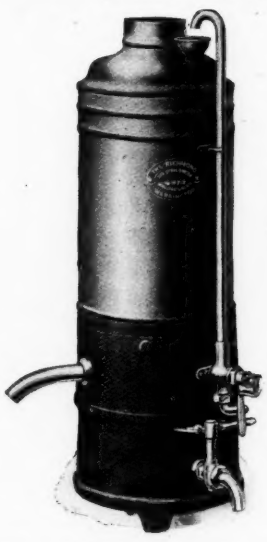
The Brooklyn Borough (N.Y.) Gas Company did some good business in the twelve months ended the 31st of December last. In that period they sent out 318,505,700 cubic feet, or an increase of 45,252,700 cubic feet over the previous year. The meters in use on Jan. 1, 1914, numbered 10,343, representing an increase of 1401; and the distributing system was extended by the laying of 6½ miles of pipe. The net profit for the year was $50,380 (£10,496)—an increase of $11,395 (£2375) over 1912.

According to an article in the Engineering Supplement to "The Times," the following figures may be taken as the manufacturing costs, per 1000 cubic feet, of producing oxygen, hydrogen, and nitrogen by modern methods: Oxygen, 1s. 4d.; hydrogen by Linde plant, 2s. to 4s.; ditto by furnace method, 2s. 10d. to 3s. 3d.; nitrogen, 3d. to 1s. 6d. It is pointed out that wide margins have been given in the cases of nitrogen and hydrogen; and it is explained that this is due to the fact that the cost is influenced to a somewhat remarkable extent by the size of plant used.

SEPARATE POINT WATER-HEATING APPLIANCES.

Some New Goods of Richmond's Make.

In talking of the water-heating business, much emphasis has lately been laid on the gas-heated water-circulator. Both the general advertisements of the gas industry, and those of the makers of gas-heated water appliances, have laid special stress on the circulator; and it has been rightly boomed as being something comparatively new, a great convenience, and a good supplanter of the ordinary coal range, with all its inconveniences, for raising the temperature of water to the degree desired for general household purposes. Attention, however, must not be strictly limited to this form of water-heater. There are a large number of houses in every gas-supply district in which the gas-heated water circulator, good as it is, will not, for economic reasons, find a home, and in which a point heater would be very serviceable and therefore acceptable. The circulator is now let out on hire by many gas undertakings; but not all undertakings are prepared to hire-out geysers and water-boilers. This restricted policy should be altered; for we can conceive that the field is large within which the simpler gas-heated water appliance could be exploited with great advantage. Perhaps one cause for hesitancy in letting the simpler gas-heated water appliances on hire has been the question of their maintenance. The strongly made circulators do not give the same ground for hesitancy on this score; and therefore it is for the makers to give the gas industry point heating appliances at fairly moderate cost, which will stand the racket of hard use in the modest dwelling where it is not desired to go in for the more expensive circulatory system —more expensive both in first and in running cost. The question of maintenance, with the hiring-out system, is one for the gas undertakings; and they share with the householder the desire for economical working. The householder who only needs hot water at one point does not want to go to the expense of heating a volume of water the whole of which he does not require by means of the circulator system, which system has not the same over-all efficiency, through heat losses, as the point water-heater. For these various reasons, strongly made water-heaters for local and not general supply are things to be cultivated.

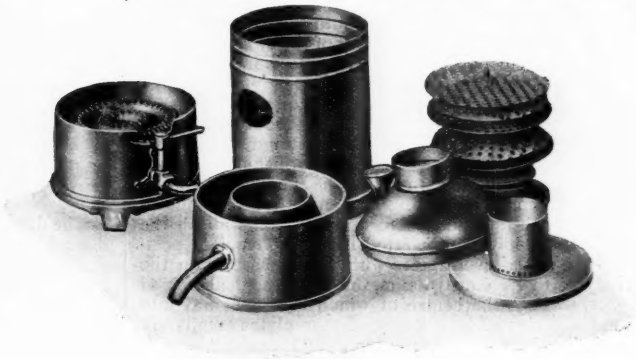


"Colne" Geyser, with Interlocking Gas and Water Taps.

With their "Ironclad" water-circulators, which were introduced last year, the Richmond Gas Stove and Meter Company, Limited, made a point of the question of maintenance combined with efficiency, and so did other makers with their special forms. But the demand for more durable geysers and water-boilers has been pressed upon the Company. They have therefore this year essayed, and successfully, to meet the requirement. Two types of a new form of geyser may be specially noticed. There is first the "Colne" geyser, which is of the open type. About this there are several features to be noticed; but the salient one is that, instead of the vessel being constructed entirely of copper, and only finishing with a cast-iron base-plate, the copper construction ends with the boiler; and the whole of the base (the dark part in the first illustration) is constructed of cast-iron. In this and the other new forms of heater, there is also a point which may be at once noticed; and it is that the whole of the members can be simply lifted apart; and the construction is altogether innocent of complicated attachments. The advantage of this from the point of view of maintenance and replacement of parts needs no emphasizing. Reverting to the cast-iron base, this is made in two parts—the bottom one contains the burner, preferably for luminous flame work; the top part is the hot-water container. A particularly serviceable feature is that this top part can be turned round, so that the hot water can feed from the tap into a bath or any other receptacle adjacent to it. Inside this top part of the base, the hot water container is of annular form, with the inner wall sloping downwards owing to the conical shape of the passage for the ascending heat and products of combustion. The heated current strikes on to an inverted saucer-shaped baffle, and is dispersed under its sides and up through the internal structural parts of the boiler. This upper part of the boiler is precisely of the same form as the firm's "Dee" water-heater. There are a series of convex and concave perforated plates superposed one above the other on a supporting rod. The water descends through the perforations in the plates. The heated current from below passes upwards; so that as a water-heater the appliance is highly efficient. A shield is provided at the bottom so as to prevent any of the water, in flowing to the hot-water container, straying away and interfering with the action of the burner. The water is fed into the boiler by means of a top funnel. The inflowing cold water is utilized as a water jacket—the water rising in the annular space, and, overflowing, finds outlet into the inner part of the heater and to the perforated plates through a series of holes round the exit for the products of combustion. Regarding the burner, this is the firm's ordinary swing-out safety tap; but, if desired, the heater can be fitted with interlocking gas and water taps. Some indication as to the capacity of the heater will be gathered by saying that (with luminous flames) it will supply 2 gallons of water per minute, raised 40° in temperature.

Reference has been made to the facility provided for the cleaning, repair, and renewal of all parts through separate and hand detachable construction. But this facility is largely lost with a fixed flue-pipe. The difficulty has been overcome by the design of a telescopic flue (patented), which has also the advantage that it is adjustable to any height needed in installing the heater. For the support of this telescopic flue-pipe, a holder, with wall pad and split grip, is supplied; and the connection (consisting of a piece of pipe) between pad and grip can be cut to any desired length by the fitter to suit any local condition. The convenience of the telescopic arrangement has been applied to the usual draught screen or (this seems to be a more suitable term) bath-room ventilator. This reference to the telescopic flue-pipe is something in the nature of a digression; but its usefulness certainly deserves special mention.

Another heater is really a companion one to the "Colne." It is called the "Conway," but is of the closed type. It has externally many of the features of the "Colne." The top is of copper; the base of cast iron, and constructed as already described. But the water in being heated does not come into contact with the products of combustion, as is the case with the "Colne" heater. A point that immediately strikes one is the readiness with which the interior parts can be removed for cleaning without interfering with gas and water connections. Being a closed water-heater, the inside construction of the boiler part is totally different from the previously described type. The middle of the heater is occupied by a cylindrical cup, forming a large heat chamber or way. The water travels up the annular water-jacket space into the space at the top of the heater, and there the heated water flows into



Parts of the "Colne" Heater.

Telescopic Flue for Geysers.

an outlet-pipe which runs through the heat chamber. In doing this, the pipe being very hot, the stream of water picks up further heat before passing into the hot-water receiver. In the base of the heater, there is (above the hot-water container) an extra part for the condensation water. This member of the heater is treated by the Bower-Barff process to prevent rusting. The reference made to taps in describing the "Colne" heater also applies in this case.

Now there is before us a rectangular or triangular corner boiler, which has been specially designed by the firm for the supply of hot water over sinks, or (say) in nurseries. The object aimed at in this instance has been to get a cheap boiler, of simple construction, and of good efficiency, with a capacity of 5 or 10 gallons. The body is the boiler or water container. In the midst of the water is a cylindrical heat-way which obtains heat from the swing-out safety burner in the base. In the heat-way there is a series of cast-iron deflector plates, carried on a rod, so that the whole can be removed *en bloc*. These are fairly thick plates, with four curved openings in each of the sides for the passage of the products of combustion. The intervening parts of the deflector plates are of such size that the edges come into contact with the sides of the cylindrical container, and thus transmit their heat to it, which, in turn, parts with the heat to the surrounding water. The cold water is carried, through a funnel, to the base of the boiler; and the hot water is drawn off at the top. The boiler must, of course, be filled with cold water before lighting the gas; then, when hot water is drawn off, the cold water must be turned on again—in other words, the hot water cannot be drawn off until the cold water is turned on. These boilers are made in galvanized sheet metal or copper.

Though there are several other types of heaters to be seen in the Richmond show-rooms, we can only notice, in addition to the foregoing, two others—the first being the "Equator," which is a self-contained circulator and storage tank—thus doing away with a separate cylindrical storage tank. It can be connected up to the kitchen range circulating system, or placed in a convenient part of the house, provided the hot and cold water pipes are available. The circulator is of mild steel galvanized plate construction, and welded; so that durability and pressure resistance are assured. The only jointed part is a hand-hole through which cleaning of the interior of the circulator can be readily accomplished, though the construction is such that there is little possibility of sediment. A thermostat is provided for the control of both the gas supply and the temperature of the water. The burner is of the swing-out type; and the heating arrangement is precisely the same as in the rectangular or triangular boiler already described. The "Equator" is made in three sizes—10, 20, and 30 gallons.

Finally, there is a new apparatus for the production of boiling water only. It is known as the "Novus" counter boiler, and it meets the requirements of all catering establishments, more particularly for the brewing of tea and the making of coffee. It is primarily intended for fitting underneath restaurant or tea-shop counters with the funnel and operating taps above the counter, and a cold-supply cistern fitted in any convenient position providing the water-level agrees with the mark level on the funnel. Briefly as to its construction, there is a conical shaped body of copper, through the centre of which is a heat-way into which is fitted a series of cast-iron deflector plates (similar in design and construction to those found in the "Equator" boiler). The conical body is provided with a man lid and emptying tap, and is mounted on a strong cast-iron base, fitted with the swing-out luminous burner. The funnel portion and accessories are of nickel-plated copper. To operate the boiler, first light the gas and close the lighting door; then turn on the small gas-lever, which is connected by chain to the gas-valve opening the valve to the full. Four minutes after lighting, boiling water can be drawn off *ad lib.*, to the extent of half a gallon per minute, by turning on the hot water flow-tap. The boiler is not fitted with a thermostat; but the gas-lever is on the ratchet principle; and, on turning off the hot water draw-off tap, the ratchet comes into play, turning down the gas-lever again, so that the gas is reduced to pilot size.

The Counter Heater for Boiling Purposes.

As the draw-off tap is at the highest point of the heater and above the cold water-level, it will be understood that the delivery tap will only supply boiling water as the water must be made to rise before it can be delivered.

Sufficient has been said to show that in these water-heaters, a serious attempt has been made, with success, to meet the conditions described in the opening paragraph of this article. Experience has been necessary to demonstrate the wide range of requirement in this water-heating business, and requirement is being met—thus increasing the possibilities which are opening out to the view of the gas industry with increasing rapidity.

FIRE-CLAY v. SILICA BRICKS FOR RETORT-SETTINGS.

American Views on the Question.

In the "Journal" for the 17th of March (p. 740), we gave extracts from a paper, entitled "Notes on Vertical Settings in English Works," read by Mr. C. A. Learned, the Manager of the Meriden (Conn.) Gaslight and Coke Company, at the last annual meeting of the New England Association of Gas Engineers. The author presented to the members the results of a visit he paid to this country in the spring of 1913; and one of the conclusions he arrived at was that American gas engineers had something to learn on the subject of fire-bricks for vertical retort-settings. The paper gave rise to a long discussion, in the course of which the following remarks on the matter were made.

Mr. J. S. De Hart stated that when he was last in England he spent some time in trying to find out why better results were being obtained with the material used in vertical retorts than in America; and he made a short trip to Scotland to see the manufacture of brick in the Glenboig district. He obtained analyses from several other plants, and also of some from the southern part of England. Procuring analyses of American clays, and comparing the two, he found that the brick which was satisfactory in England ran very much higher in silica than any of the American clays. He also found that the bricks used in the vertical settings were burnt very much higher than the material in use in America, and that samples from each shipment of bricks were tested as they came to the plants for shrinkage and fusion, to be sure that all the shrinkage had been taken out in the kilns. On returning to America he found that the coke-oven people were using a quartzite material, or a clay mixed with considerable straight silica rock, which compared in analysis very closely with English clays. His Company had used this material in their settings because it shrank less under working heats than material made from American clays. Later they were approached by the silica salesmen, who had something to say about this material. They were asked for laboratory tests; and the condition which finally decided the Company in the adoption of silica in preference to quartzite was the higher conductivity shown by these tests. They found that the ordinary retort clay was about the best insulator they could have used between the combustion chamber and the coal; and they now felt that they must employ straight 96 per cent. silica in the combustion chamber and retorts of their settings.

Mr. C. H. Nettleton said a year ago he presented a paper

giving the results with vertical retorts at Derby (Conn).* They were obtained from tests made by Dr. Beardsley, the Chemist of the New Haven Gas Company, and his assistants; and they seemed very favourable indeed. The present results were not nearly so good; and in his (the speaker's) opinion the observed falling-off was due entirely to the fire-clay material used in the retorts and settings, which had shrunk badly. Nevertheless, they were doing very much better with the settings, even under present conditions, than they did with the horizontal ones. It seemed to him to be only a question of time when a vertical retort and setting would be produced which would last as long as the English verticals, and do equally good work. They were doubling their plant at Derby; and this showed better than anything else the faith of the management of the Gas Company in vertical retorts. In the new plant, silica retorts made of blocks—*i.e.*, sectional retorts—were being used; and they were much larger than those they now had. They hoped for a very much larger yield of gas per retort, gas of better candle power, and a much greater output per man. He had not seen anything to cause him to change his opinion that, for small works at least, vertical retorts were the best things yet brought out; but so far as experience in Derby went, they had not yet been perfected.

Mr. STILES said he thought the success of vertical retorts would depend upon the success of manufacturers in getting materials to stand the heats obtainable with these retorts. While they had samples of silica and fire-brick with a stated fusing-point of probably 3200° or 3400° Fahr., when in actual operation on the bench it would possibly be 300° or 400° lower. In their first installation the combustion chambers were lined with silica of English make, and, as near as they could find out, there was only about 85 per cent. of silica in it. Therefore, when they tried to carbonize American coal, they did not get very good results, and had to lower the temperature. He had a few figures on a year's operation of the first bench: Average daily make of gas, 203,000 cubic feet; make per mouthpiece, 25,462 cubic feet; number of men employed, two; make per man, 101,852 cubic feet; make per pound of coal, 5·32 cubic feet; coke used per 100 lbs. of coal, 16 lbs.; candle power, 15½; candle-feet, 82·5; gallons of tar per gross ton, 14·6. They installed a second bench of verticals, and while the construction was a little different, it was built entirely of American material. They rubbed the retorts down very smooth. The bench had been working continuously for about three months, and they had not had to open the bottom of the mouthpiece for any hanging-up of a charge; whereas with the first bench they had to keep men poking occasionally to get the worm to take hold. The following figures showed that the second bench, with the same number of men, was doing a little better than the first: Average daily make of gas, 237,000 cubic feet; make per mouthpiece, 29,660 cubic feet; make per man, 118,642 cubic feet; make per pound of coal, 5·49 cubic feet; coke used per 100 lbs. of coal, 13·9 lbs.; candle power, 15·3; candle-feet, 83·9; gallons of tar per ton, 15.

Mr. BURGI said he agreed with Mr. Stiles that it was all a question of getting a material to stand the heat. The reason why they needed more heat in America than in England was the quality of the coal. Three years ago he took 200 tons of coal to England, and tried to put it through a setting at St. Helens. The setting was passing the English coal they were using—half slack and half nut coal—all right. They had a good heat in the combustion chamber, and the coke came out very well burnt. The moment the American coal went into the retorts the heat went down, and they could not burn the coke properly; in fact, they were not able to carry enough heat in the setting to burn off the coal. This was the reason they had so much trouble in America. He did not know whether they would be able to get a material that would stand the heat; but he had not found it. People said material was made that would stand 3500° Fahr. or more; but about 3200° Fahr. was the best he could get. As Mr. De Hart had said, silicate material had a better heat conductivity than quartzite; and it was possible that they need not apply so much heat to the outside of the retort to carbonize their coal.

Mr. DE HART said he did not wish anyone to feel that higher heats must be employed in a vertical than in a horizontal retort, or that any better material was necessarily needed; but they must provide for the shrinkage which took place in a vertical retort, and which was seldom noticed in a horizontal one. They must look after the shrinkage that would take place at the normal working temperature, if they were using clay material, regardless of conductivity or anything else.

Mr. BURGI said a shrinkage of retorts had not been their experience. The first setting had been in operation more than two years, and the retorts had not shrunk a bit; but the fire-clays, with the silica material on either side, had shrunk. The silica material in the first setting absolutely ran away.

Mr. TAUSSIG said he had been making a study of fire-brick material for vertical retorts, and the conclusion he had come to was that in America they had not yet learnt how to make a material as to the behaviour of which they could always be certain, nor how to duplicate it when made. He wished to call attention particularly to some experiments that had been made in Washington, which should be brought home to every fire-brick manufacturer, and be studied by every man contemplating fire-brick work. They now made tests that enabled one to tell just how much a brick would stand or how much it would shrink under load conditions. The refractoriness of a material did not necessarily mean how well it would stand under working conditions. They used some of the most refractory materials made in America, which would not stand a load when it got beyond (say) 2500° Fahr. without shrinking excessively. They found that brick would stand a load below (say) 2500° Fahr. without any appreciable shrinkage; but when heated up to 2600° Fahr.—a margin of 100°—it would shrink ¾ inch in 9 inches. He emphasized this as an important point to be considered when they were building brickwork to stand high temperatures. The trouble they had with vertical retorts in America arose from the fact that they were trying to work them to their maximum capacity.

Mr. MILLER agreed with Mr. De Hart that it was not necessary, though almost everybody seemed to think it was, to have higher temperatures with vertical retorts than with any other type of bench. There was no reason whatever, in his experience, why the temperature should exceed 2300° or 2400° Fahr.; and he thought they could get materials in America, both silica and fire-clay, that would stand these temperatures.

Mr. RAMSBURG said he should like to call attention to one very important difference between clay and silica materials: Clay does not expand nearly so much as silica at low temperatures; but above 2000° Fahr. the action is very different. A first-quality clay-brick begins to shrink at this temperature under load, and at 2400° Fahr. the action becomes very marked. With true silica brick, the curve of volume is practically a constant from 2000° to 2600° Fahr., above which temperature there is again a slight expansion. The speaker said it seemed to him that this variation was an important point in the successful operation of continuous vertical systems.

Mr. D. R. RUSSELL said the question of refractoriness was a difficult one; but, in his opinion, American manufacturers had at hand raw material equal to any other in the world. He thought they were capable of making materials which would work very uniformly, within certain limits. They could produce an article that would be entirely satisfactory, provided they knew the conditions under which the material would be worked, and if the operators would keep to one coal. The trouble was that they did not do this. They used a coal that required more heat; they altered the draughts; and then they had a great deal more heat than they were aware of. But they did not know it; and the variation of 100° Fahr. on certain materials would make all the difference in the world. He thought the attempt, as Mr. Taussig had said, to get more work for a given amount of money spent on plant, or a little more yield from the coal used, had caused a good deal of the trouble experienced. He agreed that provision should be made for expansion if pure silica material were used, or contraction or shrinkage if fire-clay were employed; and then he thought they would have no difficulty with either home or foreign material if they kept within reasonable bounds. One great trouble was that the operator did not keep track of the heat, as he claimed that he did. It was left to a man who was supposed to be responsible, but who did not take care to see that the heat was kept within the required limits. Then trouble arose, and the whole thing was dumped upon the fire-brick manufacturer, who had for years been bearing the blame.

Mr. POLK said he should like to ask anybody operating vertical retort-settings what was the highest temperature he could state positively was maintained in them—not what he thought it was, but what he knew it to be.

Mr. TAUSSIG: We make it a practice to determine our heat regularly with a Wanner pyrometer, and we can vouch that our temperatures in the combustion chamber never exceed 2600° Fahr. We try to run them below 2500°, but never above 2600° in the combustion chamber. That is about 100° more than the retort chamber temperature. Our combustion chambers are so designed that there is no load upon them, and shrinkage does not matter; so if we have a material that will stand over 3000° Fahr. in our combustion chamber we have no trouble below this temperature. But, as Mr. Russell has said, and as I will again emphasize, material under a load is very different from one that is just being tested in an electric furnace. Material will change under load where it would not change at all if not loaded; and that is an important feature.

After some further remarks,

Mr. SAYER said he should like to give the members the benefit of some experience his Company had had with silica material. This he did as follows: For some years we have been building benches, using fire-clay retorts and settings; and our experience with this class of material has not been satisfactory. The retorts would last from one year to three years; sometimes, using great care, they would last four years. About five years ago we started making some practical tests and experiments with silica material, and the result has been that up to the present time we have installed several hundred benches, using sectional silica retorts and settings, and have not had a single complaint or failure with this material. I am speaking now entirely of horizontal benches. We have had benches of silica material running for four-and-a-half years. One of them was recently taken down for the purpose of making room for other apparatus, and we found that the silica settings were almost in as good condition as the day they were installed. The bottom part or floors of the retorts near the mouthpieces had partially worn away to a distance of about 2 feet back, and this portion of the retort required replacement. I think the silica retorts and settings at Worcester have been in operation approximately four years. I understand that recently

* See "JOURNAL," Vol. CXXII., p. 1016.

they let down the heats on the benches, and renewed the floors only of these retorts, and that the sides and tops had not been disturbed, for this portion of the retorts was in a very satisfactory condition and did not need replacement. Apparently they will get three or four years' more life out of their silica retorts and settings. In the coke-oven industry for many years they used fire-clay material for lining their ovens; and, from inquiry, I find their experience has been quite similar to that which the gas people have had with benches—the linings of the ovens would last from two to three years. The Semet-Solvay Company at the present time have some ovens lined with silica that have been running seven-and-a-half years, and they expect to get several years' more work—giving a total life of approximately ten years; so I can see no reason why we are not warranted in anticipating a similar experience with silica in the matter of gas benches. In some of our half-depth installations we have benches operating alongside each other, some being filled with fire-clay and others with silica retorts and settings. The benches themselves are identical in respect to design and size. In the benches filled with fire-clay retorts and settings, we are able to carbonize only about 6 tons of coal per 24 hours; while in those adjacent to them, with silica retorts and settings, we have been able to carbonize a little over 7 tons of coal per 24 hours. The retorts in both instances are 16-inch by 28-inch, and 9 feet in length. On looking into the oven of the benches containing the fire-clay retorts, the temperature in the combustion chamber, the settings themselves, and also the outside of the retorts, was considerably higher—that is, as far as appearance was concerned—than in the benches containing the silica retorts and settings, notwithstanding the fact that the silica benches were carbonizing upwards of 1 ton of coal more per 24 hours. In my opinion this is more or less a practical proof that silica must be a better conductor or transmitter of heat than fire-clay. As far as we are able to judge, silica retorts and settings in horizontal benches should last not less than six years, while, under the same conditions, the fire-clay will last not more than three years. At the end of the fourth year it may be necessary to replace or renew some or all of the silica sections in the floor of the retorts. Generally speaking, from our experience, there is very little comparison between fire-clay and silica as a material out of which to construct retorts; and it is our opinion that sectional silica retorts and settings will rapidly supplant those of fire-clay.

Mr. LEARNED, in the course of his reply upon the discussion, stated that when in London he was told by a son of one of the Scottish fire-brick makers that they had remodelled their plant, and had been trying for five years to get something that would work satisfactorily in vertical retorts. The English specification on which he was working with verticals was 65 per cent. of silica, 32 per cent. of alumina, and the rest earthy matter. He (Mr. Learned) did not know that this amounted to anything in America, because the conditions were doubtless entirely different—at all events, the coal was. When he spoke to Mr. Glover at St. Helens in regard to the 200 tons of Pittsburgh coal that was brought from America, he stated that he had had some difficulty in carbonizing it, as it took a great deal of heat. He (Mr. Learned) was not bright enough to ask him if it burnt down his benches; but Mr. Burgi had said that it pretty nearly took the life out of his Glover-West retort. So that they were "up against" a real proposition in using American coals.

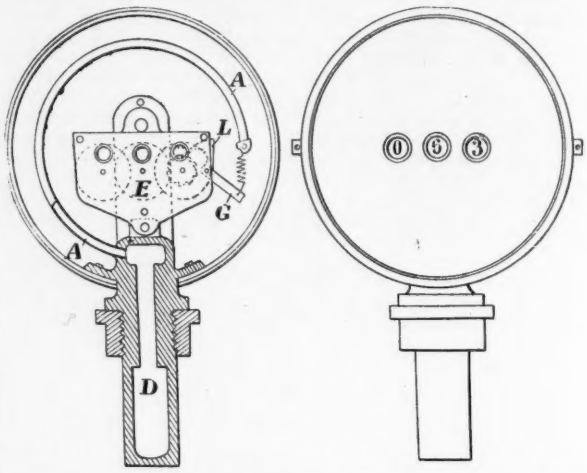
Improved System of Keeping Water Companies' Accounts.

We have received from Mr. R. Bishop, the Secretary of the Portsmouth Water Company, a copy of a work which he has just had published by Messrs. Waterlow and Sons, Limited, bearing the title of "The Twentieth Century System of Accounts." It contains a description of a system devised by him in connection with the rental accounts of his Company, and before its adoption it was favourably reported upon by a firm of eminent accountants. Its principal features are the abolition of the posting of cash payments and of the carrying-out *in extenso* of each quarter's debit, and the adoption of the adding-machine. It is claimed that the resulting economy in labour is practically three-tenths—in other words, seven clerks would do the work of ten. The saving in salaries may therefore be anything between £400 and £600 a year. Apart from this, however, Mr. Bishop says the new system is calculated, by relieving monotony, to give a clerk more interest in his work, and make him accurate. It has equalled all his expectations, and has given great satisfaction to his Directors, who have granted permission for the publication of two of the forms by which the description is accompanied. The work is copyrighted, and copies may be obtained on application to the publishers.

Manchester Junior Gas Association.—We learn from the Hon. Secretary (Mr. James Bridge, of Stretford), that arrangements have been made for the members of this Association to visit next Saturday afternoon the Great Harwood Gas-Works of the Accrington Gas and Water Board, at the invitation of the Gas Committee and the Engineer and Manager (Mr. C. Harrison). The features of interest at Great Harwood are a complete installation of coal and coke handling plant and stoking machinery, and the pumping-station of the Board. After refreshments have been partaken of at the works, Mr. J. Edmonson, of Manchester, will read a paper entitled "Mechanical Engineering Practices in Gas-Works."

HEAT RECORDER FOR RETORTS.

A heat-recording instrument for use with retorts working intermittently has been devised by Sig. Gino Ciapetti, who has taken out a French patent [No. 464,139] for it. The specification furnishes the following particulars in regard to the appliance, which is shown in the accompanying diagrams; fig. 1 being a sectional view, and fig. 2 an outside view.



The recorder consists of a receptacle D containing methyl or absolute alcohol, or a volatile liquid having a boiling-point lower than that of alcohol. The receptacle ends in a tube A, which, through the agency of a spiral spring, actuates a lever G provided with a clutch L, gearing with the teeth of a wheel which sets in motion a meter E having three figures. The mechanism is placed in a metal box, the front part of which is shut with a lid wherein are three glazed openings (fig. 2), through which the figures on the meter can be read.

This simple instrument works as follows: The hot vapours liberated from the apparatus heat the receptacle D, and raise to boiling-point the volatile liquid contained in it, so as to produce a pressure inside the receptacle and the tube A. This causes the latter to move upwards, and displace the lever G, which in turn pushes the meter wheel one tooth farther to record the operation executed. When this is finished, the retort will be emptied and refilled. During the latter operation it will have time to cool; the vapours formed in the receptacle are condensed, and, when pressure ceases, the tube A returns to its place, and the instrument is ready to record a fresh operation. It can be adapted, according to the construction of the retort, either to the chamber or to the lid, or it can be placed on a connecting-pipe from the chamber and condenser.

Mr. Barker North on Explosions.

At a meeting of the West Yorkshire Branch of the Association of Teachers and Technical Institutions last Saturday week, a paper was read by Mr. Barker North, A.R.C.Sc. (Lond.), Assistant Professor of Chemistry at the Bradford Technical College, on "Explosions." Mr. North referred to the explosions caused by marsh gas, and said that the combustion of marsh gas and oxygen was shown by the following equation: $CH_4 + 2O_2 = CO_2 + 2H_2O$. From this chemical equation they saw there was no actual change in the volume of the gas through the combustion. In the gases which were produced by a perfect marsh gas and oxygen explosion, the volume of the gas formed was exactly the same as the volumes of the gases which were reacting together. The explosion of a mixture of marsh gas and oxygen was entirely due to the heat which was produced by the chemical action; the heat causing sudden expansion of the gas, and thus putting the gases into rapid vibration. To produce a perfect explosion of marsh gas, two volumes of oxygen were needed to every one volume of marsh gas. Among the mixtures which exploded in contact with the air was methane (marsh gas); but an explosion was only caused when the substance was between the percentages of 6 and 12. The ignition of methane and air did not appear to be immediate under 1000° C.; and if such a mixture were passed through a porcelain tube at about 650° C., ignition would take place only after about ten seconds, whereas many other mixtures appeared to ignite immediately. Each particular mixture which was explosive had its own velocity with which the explosion was propagated, though the propagation of the explosion might be prevented in a gaseous mixture by giving to the gaseous mixture a velocity greater than the velocity of the explosion. A simple example of this was the bunsen burner, in which an explosive mixture of gas and air was burnt without the flame striking-back and exploding the main bulk. The gaseous mixture might be made more explosive—that was, the velocity with which the explosion was propagated might be increased—by diminishing the proportion of gas or by increasing the proportion of air.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Calorific Test—A "Fair Decision."

[In the "Manchester Guardian" last Thursday an article appeared on the subject of the application of the Gas Light and Coke Company to Parliament for a revised calorific test, and the elimination of the illuminating standard and test. The article stated that the Manchester Gas Committee were "in the happy position of having no statutory limits to fret or hinder them in their work." Then the writer went on to say that the Gas Committee "are in sympathy with their London friends, and have allowed their Engineer (Mr. J. G. Newbigging) to go to London to give evidence in support of the Bill, because they realize that its passing will be for the advantage of the gas industry as a whole." This was an interesting statement to make, seeing that Mr. Newbigging was in London in opposition, on behalf of the London County Council. However, he explains the situation in a letter which he has forwarded to our contemporary, and a copy of which he has also sent to us; and we publish it for the double purpose of putting Mr. Newbigging's position in the right light, and for giving publicity to his statement that the decision of the House of Lords Committee is "a fair one."]

SIR,—In the remarks in to-day's issue of the "Manchester Guardian" on the above question, there appears to be some misunderstanding as to my position in the matter, which I shall be glad if you will correct at the earliest possible moment.

I have long been in favour of the substitution of the calorific power test for the illuminating power test for town's gas, because about 90 per cent. of the gas now used depends upon calorific power, and not illuminating power, for its usefulness.

In fixing a calorific test, however, it is necessary that it should be such a figure as will not render the flat-flame burner entirely useless as a lighting medium.

The Lords Committee who have been considering the Gas Light and Coke Company's Bill this week have decided that the illuminating power test shall be abolished, and a calorific standard of 540 B.Th.U. gross per cubic foot adopted, with no penalties unless the calorific power falls below 499·5 B.Th.U. gross per cubic foot. The proposals of the Company were that penalties should not ensue unless the calorific power came below 475 B.Th.U.

I gave evidence for the London County Council in favour of the calorific standard not being fixed at too low a figure; and the decision of the Committee for this particular Company is, under the circumstances, a fair one.

Manchester, April 30, 1914. J. G. NEWBIGGING.

Waidener and Mueller on Industrial Gas Calorimetry—A Correction.

SIR,—In my letter on the above subject published in your last issue, you print the "Mean Difference" as "+ 1," whereas it should be "+ ·1," or, as I generally prefer to write it, "+ 0·1."

Nechells Gas-Works, Birmingham, May 1, 1914. W. B. DAVIDSON.

Lighting of Scarborough Spa.—In the sketch of the life-work of the late Mr. Alexander Allan, of Scarborough, in the "JOURNAL" for the 21st ult., it was stated that "one of his latest achievements was the illumination of the Spa by means of high-pressure lamps, producing a very fine effect." Messrs. William Sugg and Co., Limited, write to point out that this is incorrect; for the light is not high-pressure gas, but ordinary low pressure. They say: "All the lamps used are our 'Regent' lamps, with upright fixing; but owing to the excellent results obtained from them, we believe that many people have thought the lamps were being served with high-pressure gas."

REGISTER OF PATENTS.

Coin-Freed Device for Controlling the Supply of Gas.

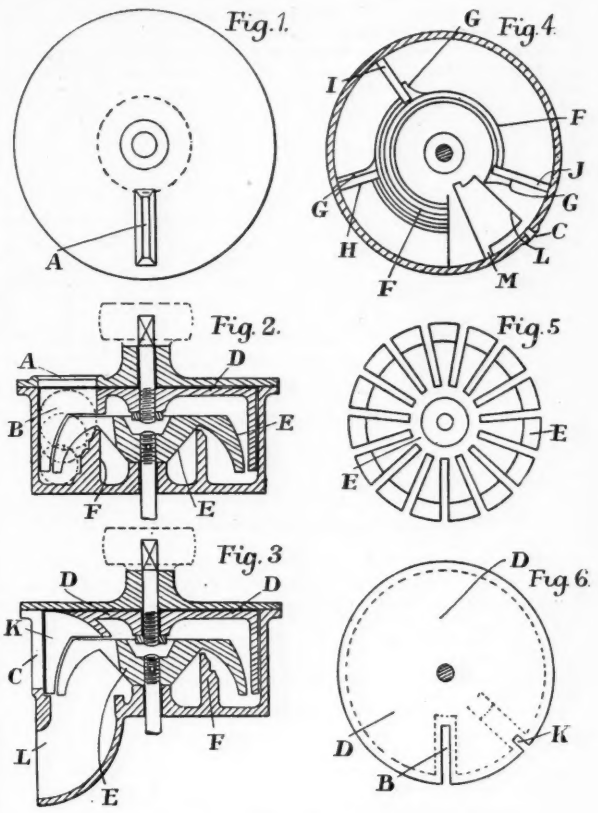
JAMES MILNE AND SON, LIMITED, and FOX, T., of Edinburgh.

No. 8521; April 11, 1913.

This device is adapted so that the coin engages, and forms a connection between, two slotted rotary members, one of which is connected to the gas control means; while the other is adapted to be operated by hand. The outside casing is provided with a single slot for the reception of coins of different value but of any one metal, while a second slot is provided for coins of another metal—the arrangement being such that, on the insertion of a coin, the operator is enabled to rotate the mechanism through an angle proportionate to the value of the coin inserted.

Fig. 1 is a plan of the device. Figs. 2 and 3 are sections. Fig. 4 is a sectional plan of the casing. Fig. 5 is a plan of the toothed wheel or slotted member. Fig. 6 is a plan of the recessed drum.

The fixed casing is of cylindrical form, with bearings top and bottom for a pair of rotary shafts or pins. The upper shaft is provided outside the casing with a handle, by means of which it may be rotated by the operator, while the lower shaft is connected, outside of (or beneath)



Fox's (Milne and Son) Coin-Freed Meter Mechanism.

the casing, with any "fluid control means of any suitable or well-known form." The upper shaft has secured on it—at the interior of the casing—a recessed drum D, free to rotate within the casing; and formed in the top of the casing is a slot A, large enough to receive the largest silver coin with which the device is adapted to operate—the arrangement being such that the coin may pass from the slot into a recess B in the drum D. The lower shaft has secured on it a toothed wheel or slotted member E, whose slots or gaps may be brought into register with the recess B in the drum D and with the slot A in the cover. The wheel is preferably provided at its underside with a concentric groove or recess into which projects a concentric wall or ridge F on the bottom of the casing; and formed between the outer face of this wall and the side wall of the casing is a series of stops or projections G, for engaging and arresting the motion of the coins. The wall F is formed on its outer surface with a series of concentric ridges or steps, so arranged as to form (with the side wall of the casing or box) a series of guides or rails for the passage of the coins carried in the recess B in the drum D and in the gaps in the toothed wheel. The arrangement is such that the movement of the coin and of the two rotary members D E is arrested by the stop G as soon as the mechanism has been rotated through an angle proportionate to the value of the coin inserted. For the discharge of coins, slots or shoots H, I, J are provided, so that, after the proper angle of rotation has been given, the coin is allowed to fall out.

For the reception of pennies the casing is provided in the side with a slot C, through which the coins may be passed into a special recess K in the drum D and into one of the gaps in the toothed wheel member E. Provided in the bottom of the casing, in line with the slot C, is a shoot or opening L adapted to receive and discharge any coin smaller than a penny; while, at the correct position in the casing, a stop is provided for arresting the motion of the penny and of the mechanism. For discharging the penny an opening M is provided.

In operation the handle is first turned backwards—*i.e.*, anti-clockwise—so as to bring the device into position to receive a coin. If a silver coin is to be inserted, the slot A is used; a silver coin being inserted of any size for which the device is adapted. The device is then rotated in clockwise direction until the operation is arrested by the stop G; and, on the handle being turned slightly backwards, the coin is released and falls through the opening or shoot H, I, J. In case of a copper coin the opening C is made use of, and the device rotated through an angle corresponding to such coin. The device is so arranged that the coin can only be inserted after the handle has been turned backwards to the one position in which all or both recesses in the recessed drum D coincide with the stationary slots A C, and in all other positions of the mechanism the slots are closed.

Incandescent Gas-Lamps.

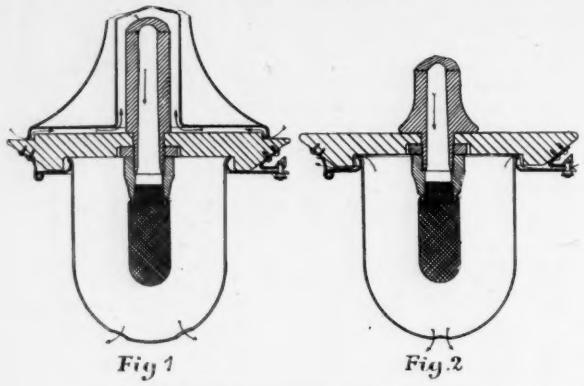
THORP, T., F., & H. T., of Whitefield, near Manchester.

No. 8532, April 11, 1913.

In constructing a lamp according to their invention, the patentees propose to dispense altogether with the chimney of the lamp and cause the products of combustion to pass away either through a hole or holes at the upper or lower ends of the globe or shield or at both of them, as

shown—a construction which, it is said, "obviously cheapens, simplifies, and lengthens the life of the lamp."

In fig. 1 the lamp would be used with high-pressure gas or air, while fig. 2 shows a sectional elevation of a lamp employed with a mixture of gas and air supplied through the service pipes.



Thorp's Incandescent Gas-Lamps.

In fig. 1, to the body of the lamp is attached, on its upper side, the bunsen tube and on its lower side the burner nozzle and the globe having holes at its lower end through which the products of combustion pass. In fig. 2 the globe or shield has only one hole at its lower end, but there is a space between the body and the globe through which the products of combustion also pass. No secondary air is required, as the amount necessary for complete combustion is supplied through the nozzle.

The patentees say that, in order to get the gas and air thoroughly mixed, they preferably use a perforated nozzle—one constructed with fine interstices extending a considerable distance from the point of flame ignition. This construction "not only assists in mixing the gas and air but prevents firing-back into the nozzle, and also preheats the mixture before reaching the point of ignition."

Atmospheric Gas-Burner Mouths.

MADGE, W. T., of Arundel Street, Strand, and WARREN, F., of Forest Gate, E.

No. 11,992; May 22, 1913.

This invention relates to burners of the bunsen type for heating purposes; and although applicable to all purposes where a bunsen flame is required, it is said to have been found of special utility for heating the melting pots in which stereo metal is prepared for casting stereo plates, in connection with type-casting machines, or like purposes.

The inventors secure upon the end of the burner-tube a burner nozzle having a series of screw threads or annular or substantially transverse grooves or serrations; and the interior of the end of the burner-tube is chamfered, and an annular groove is provided in the burner nozzle between the end of the burner-tube and the threads or grooves in the nozzle so as to assure that the gases issuing from the burner-tube shall impinge upon the screw threads or grooves in the burner nozzle. It is said that, with burners fitted with this form of nozzle, under conditions where it has previously been necessary to employ a forced air blast, this can now be done away with, while at the same time a material reduction in the gas consumption is effected.

Air and Gas Mixers.

JONES, E. C., and PEARSON, J., of Toronto, Canada.

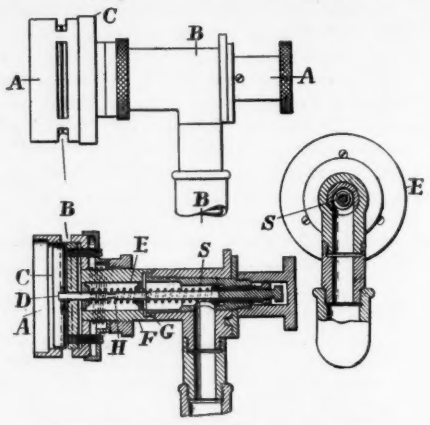
No. 12,002; May 22, 1913.

This invention relates to the combining of atmospheric air and gas in suitable proportions to produce a mixture for any intended purpose, whether for heating, lighting, or explosion, and to maintain the same proportions of atmospheric air and gas under varying conditions of gas pressure. One of the objects of the invention is to automatically control the proportions of air and gas in the mixture by utilizing the variations of pressure from normal to increase or decrease the volume of air in proportion to the increased or decreased volume of gas resulting from such pressure variation, and thus maintain the same ratio as under normal conditions of pressure.

The essential feature of the invention may be said to be the mixing-chamber A, which is provided with intakes B, and an automatically adjustable valve C to control their area. To provide for the automatic adjustment of the valve, it is fixedly connected to a movable gas-tube D, one end of which projects sufficiently into the mixing-chamber to be connected with the valve C, while the other end is contained in the bore E of a tubular collar F forming part of the mixing-chamber. The end of the tube D within the collar is provided with a disc G of substantially the same diameter as the bore, to engage the wall of it and assist in guiding the movement of the gas-tube as it changes its position during the variation of the pressure, as hereafter described.

Assuming that the normal gas pressure is 2 lbs. to the square inch, and that the force exerted by the spring H and disc G is 3 lbs. per square inch, in that case the spring S would require to be adjusted so that it would exert a pressure of slightly more than 1 lb. per square inch upon the disc, which, taken in conjunction with the normal gas pressure, would move the disc G and gas-tube D in the direction of the mixing-chamber A, and effect a slight movement of the valve C—a movement that would slightly open the air intake or intakes B and permit of a proper proportion of air entering the mixing-chamber to combine with the gas admitted through the gas-tube D. As the pressure of the gas against the disc G rose above normal, the spring H would correspondingly compress and permit of an increased movement of the tube D in the direction of the mixing-chamber—this increased movement causing a corresponding movement of the valve C to increase the area of the air intake, so that an increased volume of air to the mixing-chamber would immediately occur.

In this way, it is possible to utilize the variation of gas pressure for accurately controlling the proper proportions of air and gas in the mixing-chamber which "is necessary for perfect combustion for heating purposes, nearly perfect combustion for illuminating purposes, and the production of an explosive mixture for motive purposes.



Jones and Pearson's Air and Gas Mixers.

To enable the same mixer to be used for any of the three purposes, the mixing-chamber is provided with adjustable means for varying the area of the air intake, as the area of the air intake for heating purposes must be greater than that for illuminating purposes, and the area of the air intake for explosive purposes must be greater than that for heating purposes. To change the area, the mixing-chamber is provided between the valve C and the adjacent end of the mixing-chamber with a shutter, fitted with guide pins extending through that end of the mixing-chamber and fitted to a guide collar movable on the tubular collar F. Between the guide collar and the end of the mixing-chamber is a spring to press the guide collar away from the end of the mixing-chamber.

For explosive purposes, the adjusting nut is positioned so as to permit of the spring forcing the guide collar and guide pins outwards to their limit of motion, which is determined by the shutter coming into contact with the end of the mixing-chamber. In this position, the shutter is entirely clear of the air intake; and when the shutter is in this position, the air intake is opened to its maximum extent. For heating purposes, the adjusting nut is positioned to move the shutter away from the end of the mixing-chamber to slightly close the air intakes and thus partly reduce their area; and for illuminating purposes, it is adjusted in the same direction to move the shutter farther away so as to still further reduce the area of the air intakes.

Generating Water Gas.

STEPHENSON, J., of Salisbury.

No. 15,677; July 7, 1913.

This invention relates to apparatus for generating water gas of the type in which a series of valves and other parts are automatically actuated during a predetermined cycle of operation, as described in patents No. 6849 of 1911 and No. 26,916 of 1912.

According to the present invention, the patentee proposes to provide water-gas generating apparatus in which a series of valves and other parts are automatically actuated during a predetermined cycle of operation by devices energized electrically and controlled by a contact making and breaking apparatus, comprising one or more members regularly driven forward during the cycle of operations. The invention further comprises suitable forms of contact making and breaking apparatus, and an improvement according to which oil can be injected into a carburettor by means of the current of gas produced by a blowing device actuated by an electric motor, which also controls the oil-valve, so that the starting of the motor causes alternately the opening and closing of the valve.

The member which is regularly moved forward during the working of the apparatus, and acts as the controlling device for the timing of the various operations to be performed in the cycle of the plant, is arranged to make the necessary electrical connections in order to bring into operation the solenoids, motors, and other appliances through which the various movable parts of the plant are actuated.

The regularly moving controlling member preferably has the form of a drum, with contact members mounted on it, capable of being rotated relative to the set of fixed contact members. In place of a drum, however, a member in the form of a disc may be employed.

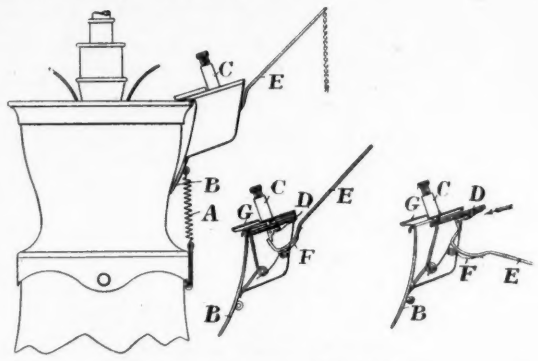
Although the controlling member is described by the patentee as moving forward regularly, it is to be understood, he says, that the movement need not necessarily be regular throughout the time of operation of the plant. The simplest form, however, appears to be a regular movement continuing for the whole time the plant is in operation. But this movement may be replaced by a movement of another kind—for instance, a regular movement of the member forward during the cycle of its operations and then a rapid reverse movement to bring it back again to the initial starting position for another cycle of operations.

Pyrophorous Gas-Lighter.

LEHMANN, W., of Neukölln-Berlin, Germany.

No. 23,713; Oct. 20, 1913. Convention date, July 25, 1913.

This gas-lighter is operated by means of a rocking lever under the action of a spring, by the rocking of which the frictional member is operated, and a spark produced.



Lehmann's Pyrophorous Gas-Lighter.

The lighter is shown fitted to an inverted gas-lamp, a hook engaging over the top rim of the burner casing, while another hook engages over the lower rim or in one of the perforations generally found in such burners. By means of the tension of the spring A between the hooks the lighter can be attached to any lamp. The casing is further preferably provided with a lower extension B, which serves as a support, bearing against the body of the lamp. On the top of the casing is a small tube C, to receive the pyrophorous metal which is frictioned for producing the sparks by means of a file D moving in a guide. The file is under the action of a spring which tends to move it in the direction of the arrow into the position first shown. For operating the file, a rocking lever E is provided, which is under the action of a spring F, which tends to return the lever into its upper position when it has been moved downward in the direction of the arrow. A nose of the lever engages behind a pawl on the file. When, therefore, the lever is rocked, the file will be moved, by means of the nose and pawl as shown in the second detail, until the nose is disengaged from the pawl and the latter is released, whereupon the file swings back in the direction of the arrow.

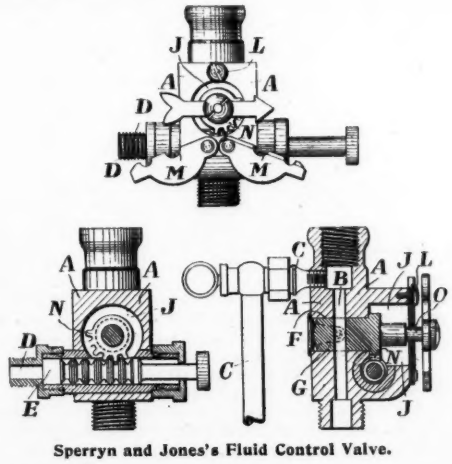
In order to positively conduct the sparks into the path of the ignitable gas current rising from the lamp, a wall G is provided by which the sparks produced by the file are made to pass over the upper edge of the lamp. At the same time the wall catches a part of the rising gas, and conducts it towards the sparks. The wall together with the guide and file thus form a guide passage for the sparks.

Fluid Control Valves.

SPERRYN AND CO., LIMITED, and JONES, R. A., of Birmingham.

No. 1834; Jan. 23, 1914.

This invention refers to valves in which a pneumatic system is employed "to enable the operation of a valve for controlling the passage of fluids to be effected from a distance when desired." The operating means in the type to which the invention relates consists of a plunger, subject to air or hydraulic pressure or motion, connected by a rack-and-pinion gear to a rotatable plug or other valve disposed in the fluid passage to be controlled.



Sperryn and Jones's Fluid Control Valve.

The illustration shows a front elevation of the body containing the operating plunger and plug valve (the hinged cover being shown open); a sectional elevation with the plunger and valve in a different position; and a central sectional view at right angles. The example shown is more particularly designed for controlling a supply of gas for incandescent burners of the inverted type.

A is the body, in which a gas passage B is formed; and C is a bye-pass connection, with a connection D for the air or liquid pipe system for operating the plunger E. The bore F, for receiving the plug valve G, is bored across the gas-passage out to the back of the body, where a simple spring closure cap may be employed having nibs for engaging depressions in the body over which it is sprung. The bore opens into the larger chamber J concentric with it, which is bored from the front face of the body and closed there by a two-part hinged cover, the ends of the parts of which engage a screw L or projection in the front of the body when they are closed, and both parts are notched at M to pass an extension from the valve G. The mutilated pinion N is shown integral with the valve G, as also is the extension O; and the pinion N is accommodated in the chamber J, while the extension O projects to the front of the cover and carries an indicator arrow.

The cylinder for the plunger E is at right angles to the chamber J, and passes through the body to receive the connection D and also a closing cap at the rear end of the cylinder. The plunger cylinder passes across the lower part of the chamber J, and is cut away in order to be open to it, so that the pinion within the chamber J may mesh with the teeth on the stem of the plunger E.

Inverted Incandescent Gas-Fittings.

GOULD, F. J., of Little Trinity Lane, E.C.

No. 26,134; Nov. 14, 1913.

The chief object of this invention is to provide a fitting having exchangeable parts whereby it can be converted from a single-burner fitting to a double arm two-burner fitting, "so that a dealer can supply single or double burner fittings from a stock which would be smaller than that which he would have to keep with the single and double fittings hitherto generally made."

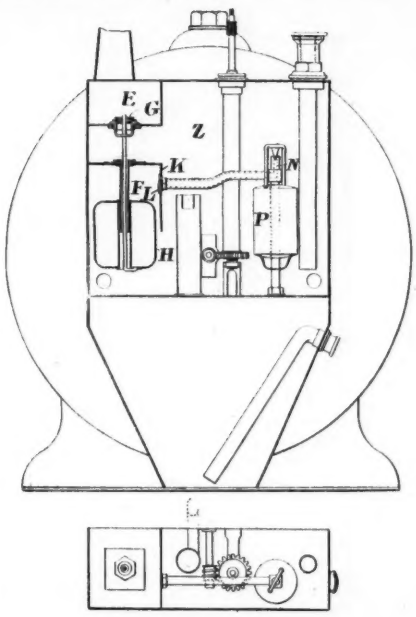
The fitting comprises a hanging or pendant stem having in it a cock and on it an ornament capable of vertical adjustment on the stem; while at the lower end is a pair of oppositely disposed arms emanating from the same boss by which they are attached to the end of the stem—both arms having a tap for separately controlling the gas, and a burner adapted to be screwed to the end of the stem. The two arms and boss are, of course, removed when the single burner is to be fitted, and *vice versâ*.

Wet Gas-Meters.

ANDERSON, J., of Edinburgh.

No. 57; Jan. 1, 1913.

This invention relates to wet gas-meters with a float enclosed in a chamber opening somewhat below the normal water-level in the syphon chamber, and it has for its object to provide a meter which will "automatically deal with attempts to pass gas in excess of the proper rate" by having "a further float disposed in the syphon chamber, and arranged to control a further opening in the first chamber."



Anderson's Wet Gas-Meter.

In the form illustrated the meter has the usual drum casing, division plate, waste-water box, and syphon and bend. In the space above the division plate are two chambers E F—the former in connection with the inlet and containing the inlet valve G. The chamber F (below the chamber E) is adapted to be closed by the water above the division plate. It contains a float H adapted to move up and down about a tube (through which passes the inlet-valve spindle connected to the float) of sufficient length to ensure that no gas can escape around the spindle. In one of the side walls K near the top of the chamber F is an aperture L connected with a small valve chamber N; the exit being controlled by a conical valve carried on or by a second float P.

The two floats are so adjusted that, when the meter is filled to the proper level, the conical valve on P is lifted clear of its seat, and the space in the top of the chamber F connected with the space Z above the water is subject to the inlet pressure. In this way the water in the chambers F and Z stands at the same level, and the float H is suffi-

ciently raised for the inlet valve G to be open. When pressure is put on the meter, the water level in the chamber Z is depressed; the float P falls; and the valve seats itself. The chamber F thereby becomes sealed, so that, notwithstanding changes of water-level in the inlet chamber during proper operations, the float H cannot fall, and the inlet valve G remains open.

Should anyone attempt to obtain unregistered gas—for example, by applying a sufficiently high pressure to lower the water level in the chamber Z and pass gas around the drum spindle and outside the bend—the water level in the inlet chamber is so much depressed that gas can bubble underneath the bottom of the wall K, with the result that the float H falls and the inlet valve G is closed. If now the gas exits be closed, the valve G will remain closed, but will automatically open again if a gas exit be opened and the pressure thus relieved, permitting the water level in the chamber Z to rise to its original height and raise the float P and subsequently the float H. All the gas thus escaping from the chambers F and Z will ultimately pass by way of the drum chambers and be registered. If, however, the gas exits be not closed, the pressure will automatically be relieved by the passage of registered gas, and a similar action occur. If the high pressure be maintained and the gas exits be open, a surging supply is produced, because the water level in the chamber Z will periodically fall below the side K of the chamber, thereby causing the inlet valve to close until the gas pressure on the delivery side of the meter is sufficiently reduced.

Table Photometers.

CARPENTER, C., of Old Kent Road, S.E.

No. 1239; Jan. 16, 1914.

The object of this invention is "to facilitate the testing of a number of different samples of illuminating gas successively." The usual method of testing gas, by means of a table photometer, needs no description, says the patentee. But when a number of different samples of gas are to be tested one after the other, time is necessary for adjusting the meter, governor, &c., in connection with each sample before the different tests can be begun. Consequently, the person who is making the tests is delayed after every test while these preparations are in progress.

According to this invention, he proposes to employ a table photometer embodying a plurality of burners each mounted on its own slide and furnished with separate connections, meters, governors, and cocks. Light-tight boxes are provided into which the burners can be retired. When tests of different gas samples are to be made, each is connected up to a separate burner beforehand; the necessary adjustments with respect to pressure, volume, &c., are made; and the burners are lighted, and are enclosed in their respective light-tight boxes. The slides upon which the burners are mounted are arranged radially of the photoped, and form different angles with the beam or ray from the standard lamp of known candle power used in the tests.

In making gas tests, he remarks, it is desirable to have the beam of the known candle power lamp and that from the burner of the gas to be tested in close juxtaposition on the photoped. "Owing, however, to the divergence of the rays of the burners in different test, there must be a provision to obviate conflict with the ray of the known power lamp on the photoped, where such conflict would arise. There is provided therefore an obstructing device for a portion of the rays both of the standard testing lamp and of the burner to be tested, which obstructing device can be moved towards, or away from, the photoped, so as to obscure those portions of the rays which would conflict, and leave unobscured bars of light sufficient for comparison in close juxtaposition on the photoped, which must be turned so as to face perpendicularly to a line bisecting the angle between the rays." Diagrammatic plan views are given of so much of a table photometer as serves to illustrate the invention.

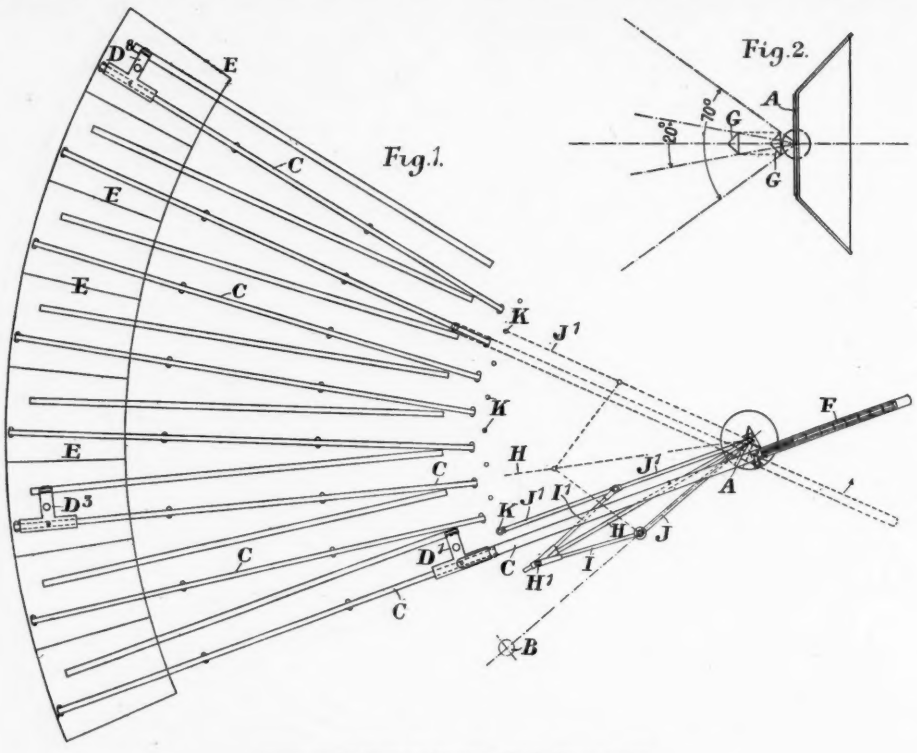
A is the position of the photoped seen detached in fig. 2; and B is the standard testing lamp of known candle power. Radiating from the photoped are a number of slides C, upon each of which is mounted a burner D. Each burner is separately connected to a gas supply through the usual meter, governor, &c. (not shown); the gas supplies being of the different samples of gas to be tested. The burners are capable of being run up one by one into the testing position or retired into light-tight compartments E out of the way. [All the slides are furnished with a common scale F to give the result of the test in the usual way.]

From an inspection of fig. 1, it will be seen that there is a wide difference between the angle of incidence of a ray from the burner D^1 on the photoped and the angle of incidence of a ray from the burner D^8. [Eight burners are indicated; but the table may, of course, be furnished with any other convenient number.]

G is a triangular screen placed in front of the photoped, capable of movement towards and away from it, and furnished with mechanism for effecting such movement. By preference mechanism is employed which will automatically determine the distance of the screen G from the photoped as the latter is turned to face in the direction of a line bisecting the angle between the rays of the light to be tested and the testing light; or, if desired, a separate distance adjusting device for the screen may be provided.

In the illustration there is a lever H made fast to the end of the axis on which the photoped turns. The axis carries a cam or equivalent device for moving the screen G out or in. In the arrangement shown there are pivotally connected to the ends of the lever H and to one another pairs of links I I^1 and J J^1; the pivotal connection to the lever H at the outer end being through a slide H^1. These links constitute a four-sided figure, the sides I I^1 of which are equal, as also are the sides J J^1. The pivoted connection of the links I and J is fixed in a direct line between the testing lamp B and the photoped. The link J^1 is prolonged and provided at its end with a device for fixing it to the table at any of the points K desired while a test is being made. By means of the prolongation of the link J^1, the lever H can be moved into line with the slide C of any of the burners D^1 D^8 and there fixed; the photoped and the screen G being simultaneously moved and retained in a proper position with regard to the lamp B. The rays from this lamp and from the burner of the gas being tested strike the back of the screen, and only their outer portions are allowed to fall on the photoped, where two parallel lines of light can be seen close together side by side in a position best suited for comparison.

With this arrangement, after the initial preparations have been made the tester may complete a series of tests of different samples without interruption.



Carpenter's Multiple Testing Table Photometer.

Electrical Breakdown at Worthing.—The fusing of an electric light cable in Worthing last Wednesday evening, and the blowing into the air of an inspection box cover, were followed by the failure of the light in some of the picture palaces and the Winter Hall and theatre. Happily, it was early closing day, so that the inconvenience was minimized. Within half-an-hour of the trouble arising, the faulty cable was repaired.

GAS LIGHT AND COKE COMPANY'S BILL AND TESTINGS FOR CALORIFIC VALUE.

On Tuesday last week the Gas Light and Coke Company's Bill came before a House of Lords Committee, consisting of Lord CLINTON (Chairman), Earl GORELL, Lord ERSKINE, Lord RAVENSWORTH, and Lord MONKSWELL.

The Bill proposes the abolition of the illuminating value test now imposed upon the Company, and to amend the present calorific power test. The maximum proposed is 540 B.Th.U.; but the Company suggested that they should not be liable to penalties in the event of their supplying gas of not less than 475 B.Th.U. A large number of other Gas Bills are awaiting further progress pending a decision in this case.

Counsel for the Bill are Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., Mr. PITMAN, and Mr. JACQUES ABADY. The petitioners against the Bill are the City of London Corporation, represented by Mr. J. D. FITZGERALD, K.C., and Mr. FORBES LANKESTER, K.C.; the London County Council, represented by Mr. G. M. FREEMAN and Mr. T. M. SNAGGE; the West Ham Corporation, represented by Mr. G. M. FREEMAN, K.C., and Mr. MORTON, K.C.; the Leyton Urban District Council, represented by Mr. COURTHOPE MUNROE; the Willesden Urban District Council, represented by Mr. ROWLAND BERKELEY; and the Ilford Urban District Council, represented by Mr. TINDAL ATKINSON.

COUNSEL'S OPENING SPEECH.

Mr. HONORATUS LLOYD, in opening, said the Bill was promoted by the Gas Light and Coke Company, and its object was to amend enactments relating to calorific power testing, and to relieve the Company from obligations with reference to illuminating power testing. At present the Company occupied a somewhat unique position, inasmuch as in the whole area of their supply they were liable to penalties in respect of deficiencies below a certain illuminating power standard, and in the greater part of their area they were also subject to penalties for a deficiency below a calorific standard, and they were, he believed, the only Company in the country liable to two penalties in this way. The circumstances under which gas was used had in recent years undergone a great change, because whereas until comparatively recently gas was used practically for lighting only, owing to various changes, the commercial use of gas had become more and more important; and thus it came about that the calorific power of the gas was more important for testing purposes than the illuminating power. In the old days, also, gas was mostly used with the flat-flame or batswing burner; but this had now become practically extinct, and gas was used for illuminating purposes in almost all cases in conjunction with the incandescent mantle. Curiously enough, what was required to produce light by means of an incandescent mantle was not gas with illuminating power, but gas with heating power, because the effect of gas used in conjunction with the mantle was to produce the heat which rendered the mantle incandescent, and so produced light; the gas itself not being useful for the production of light, but for the production of heat, in order to get an incandescent effect on the mantle.

This was one of the reasons of the great change in the use of gas; and another was the very great development that has taken place in recent years for the supply of gas for the purposes of heating, cooking, and power. In this case also the essential property of the gas was the heating power, and not the illuminating power. So long as illuminating power was the essence of gas, Parliament provided for the minimum illuminating power which the gas would produce, and the standard at which it should be supplied; and they also provided not only the standard, but the means of testing whether or not the standard was reached. Penalties were also provided, which were to be imposed if the gas authority failed to produce the statutory illuminating power. As the change had taken place, and illuminating power was not the essential feature of gas, but calorific power or heating power, various steps had been taken with a view to introducing a calorific power test. There were advantages in the calorific test to which he would refer later. The illuminating test, on the other hand, was a theoretical test, and depended largely on human ability and agency. A room had been fitted up in the House where the Committee would be able to see this demonstrated later on. In non-technical language, however, the illuminating test consisted in a person looking through a small lens in an apparatus on to a screen, upon which the light from two lamps was projected; the one lamp being the standard lamp, and the other lamp using the gas which was to be tested. On the screen was a vertical line; and the operator had to decide whether the light on both sides of this line was exactly equal. It had been found by experience that whereas one man would say that the two lights were equal, another would say that they were not. The Gas Light and Coke Company, who had fourteen testing stations, had many instances of this description. It was frequently found that the same gas made at the same works at the same time was perfectly satisfactory at thirteen of the testing stations, but unsatisfactory in the fourteenth. The Gas Light and Coke Company were the only Company at the moment who had ever been made liable to both the illuminating and calorific tests with a penalty for each. On the other hand, the calorific test was accurate and scientific, and eliminated altogether the personal element by a comparatively simple instrument.

Prior to 1860, the Gas Light and Coke Company were not under any obligation with reference to illuminating power; but by the Metropolis Gas Act of 1860, 12-candle power was prescribed as being the standard for common gas, and 20-candle power for cannel gas. The maximum price at that time was fixed at 4s. 6d., with a possible rise to 5s. 6d. under conditions with which he need not trouble the Committee. Eight years later, by the City of London Gas Act of 1868, the candle power was altered to 14 for common gas until 1870, after which it was to be 16 candles; and the maximum price was reduced to 4s. until 1870, and 3s. 9d. after that date. There was also power to apply to the Board of Trade in any year to revise both the illuminating power and the test. Again eight years later, in 1876, the Gas Light and Coke Company's Act was passed which placed the Company under the sliding-scale. The standard dividend was fixed at 10 per cent., and the standard price was 3s. 9d. per 1000 cubic feet with a slide of 5s. per cent. as the price of gas went up or down 1d. per 1000 feet. The illuminating power was then fixed at 16 candles for common gas, and 20 candles for cannel gas. Incidentally, he might mention here that in 1898 the capital of the Company was converted, and the 10 per cent. standard dividend became a 4 per cent. standard dividend. The standard price remained at 3s. 9d. as before; but the slide was altered to 2s. per cent. up or down, according to every 1d. up or down in the price. This change in the slide, however, was consequent on the change in the dividend from 10 per cent. to 4 per cent. In 1880 the Gas Light and Coke Company's Act was passed, by which the Gas Referees were called upon to make daily tests for illuminating power, and also for the purity of the gas. Penalties were prescribed for any deficiencies in the illuminating standard to the extent of 40s. for the first half-candle deficiency, and £25 for each subsequent candle up to £100; while in respect of deficiency in purity the penalty was £50 for each offence. In 1903 five Gas Bills were promoted in Parliament relating to London or to parts of London, and in all these Bills the question was raised with reference to the illuminating power and the method of testing illuminating power. One Bill was promoted by the Gas Light and Coke Company itself, and another by the London County Council in the name of the Gas Light and Coke Company; the third by the Commercial Gas Company; the fourth by the Crystal Palace Company (now known as the South Suburban Gas Company); and in the case of the fifth Bill, this, so far as this particular point was concerned, consisted of clause 54 in the London County Council General Powers Bill, by which the London County Council asked Parliament to make an alteration in the method of testing, which up to then had been prescribed in respect of the South Metropolitan Gas Company. The London County Council then, he believed, approached the Board of Trade with reference to the matter, and a Departmental Committee was appointed to consider the requirements regarding illuminating power and purity, and the method of testing; this Committee being empowered to recommend alterations if they desired. The result of the appointment of this Committee was that clause 54 of the London County Council General Powers Bill was withdrawn. The London County Council's Gas Light and Coke Company's Bill was also withdrawn, and the Gas Light and Coke Company's own Bill was passed with amendments which had been agreed upon; the standard price being reduced from 3s. 9d. to 3s. 4d., instead of, as the Company had proposed, 3s. 6d., or, as the London County Council had proposed, 3s. 1d. It was also agreed by the Company that it would not charge meter rents. In 1907, however, meter rents were charged; but by an arrangement with the London County Council, the standard price was to be 3s. 3d. instead of 3s. 4d.

The Departmental Committee which was appointed in 1904 was presided over by Lord Rayleigh. A good deal of evidence was heard, and a report made which contained various valuable recommendations. No. 4 was very important, and read as follows:

> "Although a large part of the gas used for lighting purposes is used with incandescent mantles, and the average illuminating power in itself is of no value, a considerable proportion is still consumed in flat-flame burners, and while this is the case, the Committee feel it is desirable that testing in respect of illuminating power should be maintained."

This was, added Mr. Lloyd, a step in the history of the change to which he had referred earlier. Continuing, recommendation No. 4 stated:

> "At the same time, it is clearly anomalous that, while such a test is only required in the interests of those consumers who continue to use flat-flame burners, the test should be made with an argand burner. This is a wholly different type, and practically never used by the public. The Committee do not, however, see their way, in existing circumstances, to suggest the prescription of tests which would involve a forfeiture in respect of illuminating power in a flat-flame burner, or in respect of calorific power, but they recommend that official tests in these respects, supplementary to the existing tests, but not for the purposes of forfeiture, should be made in such manner and to such extent as the Gas Referees prescribe. The results of these tests should be recorded, and will form a valuable guide for future action."

The CHAIRMAN: Was the illuminating test prescribed by the Gas Referees?

Mr. HONORATUS LLOYD: Yes.

Is it in substitution for any test?—No; the official test and the Gas Referees' tests are the same. The official tests are made by them.

Mr. HONORATUS LLOYD, continuing, said he need not read the whole of the report. Other paragraphs dealt with the prescribed illuminating power of the gas of the three London Companies, calling attention to the fact that until recently it was the same in all three—viz., 16-candle power. But at that time the South Metropolitan and Commercial Gas Companies obtained sanction to supply 14-candle power gas; while the Gas Light and Coke Company's Act required 16-candle power. The question of the uniform standard of illuminating power for the three Companies was gone into, as well as a great number of other matters; and eventually the Committee dealt with the question of impurities in the gas in paragraph 16. At that time the London Companies were obliged to remove all traces of sulphuretted hydrogen from the gas, and they were also under certain obligations with reference to sulphur impurities other than sulphuretted hydrogen, and these were of a very stringent character indeed. In the rest of the country, some undertakings were working under the provisions of the Gas-Works Clauses Act of 1871 with reference to sulphur impurities other than sulphuretted hydrogen; and the question having arisen before the

Departmental Committee, certain suggestions were made. The result was shortly: That the Committee recommended that official tests of calorific power should be made; that they should be supplementary to the existing tests adopted for illuminating power, but there should be no penalty in respect of deficiency in calorific power. They also recommended that the provisions as to sulphuretted hydrogen should be modified, and that the obligations of the Companies as to sulphur impurities other than sulphuretted hydrogen should be abolished altogether, but that the tests should continue to be taken for purposes of information and future guidance.

As a result, in 1905, the Gas Light and Coke Company, the South Metropolitan Company, and the Commercial Gas Company promoted a joint Bill to alter the method of testing gas for illuminating power, and also for purity. The London County Council also promoted a Bill, which was known as the London Gas Bill, 1905, which had in view, among other things, a direction to the Gas Referees to test for calorific power without penalties. The joint Bill promoted by the Companies was rejected by Parliament; but the Bill promoted by the London County Council was passed, and was known as the London Gas Act, 1905. This was an important Act, because it was passed in consequence of the recommendation of the Departmental Committee, and dealt with the question of calorific power. Section 3 of the Act required the Gas Referees from time to time to prescribe the burner and chimney (if any) to be used for the purpose of testing for illuminating power, and it indicated that the burner should be such as was practicable for consumers to use, and that the burner and chimney should be so used as to give the greatest amount of light when gas was burned at the rate of 5 cubic feet per hour. That therefore prescribed the illuminating power and the method of testing it. It gave to the Gas Referees the power to prescribe the apparatus that should be used, provided it was an apparatus such as would fairly test the gas under the conditions in which the consumers used it, and that the conditions should be such that the apparatus gave the best possible result when burning gas at 5 cubic feet per hour. Section 4 of the Act prescribed 16-candle power gas; and section 5, which was the really important one, dealt with testings for calorific power, sulphur impurities, and illuminating power with the flat-flame burner. Incidentally, he might mention that the question of impurities was not raised in the present Bill; but, judging from some of the petitions, it seemed as if it were going to be raised. He understood, however, that this matter would not be raised before the Committee by the opponents, or at any rate some of them. Perhaps they would all take the same course, and so he would not have to trouble the Committee on the point.

The first three sub-sections of clause 5 of the London Gas Act of 1905 were as follows:—

> (1) Each gas examiner shall at such places and in such manner as may be from time to time presented by the Gas Referees make testings of the gas supplied by the Company for the purpose of ascertaining—
>
> (i) The calorific power;
> (ii) The purity as regards sulphur other than sulphuretted hydrogen; and
> (iii) The illuminating power as ascertained by means of a flat-flame burner, to be presented from time to time by the Gas Referees, which shall be of the best available pattern.
>
> (2) Each gas examiner shall forthwith deliver to the controlling authority, to the Gas Referees, to the Chief Examiner, and to the Company, a report of the result of each testing conducted by him under the provisions of this section.
>
> (3) The Company shall not be liable to forfeitures in respect of any testings made under the provisions of this section.

This section, continued Counsel, was inserted by Parliament at the instance of the London County Council. It was the first Act in which a calorific standard was described, and was a further step in the history of the matter which he was placing before the Committee. It showed that Parliament fully realized that, although calorific power was not, perhaps, the important matter, it nevertheless required watching in relation to the supply of gas, though it was evidently then felt that the time had not yet come to prescribe a calorific power test in complete substitution for the illuminating power test. The Act merely provided for a calorific power test to be taken in addition, but without penalty. In 1909, the Gas Light and Coke Company promoted a Bill, the primary object of which was to amalgamate with their undertaking that of the West Ham Gas Company, and it was proposed to reduce the candle power from 16 to 14. In recent years it had been the constant practice of gas undertakers to go to Parliament and ask for reductions of candle power for the reason already mentioned—viz., that candle power as an illuminating power had ceased to be the important element, and that it was the heating or calorific power that was desired. The Bill of 1909 also sought to reduce the standard price from 3s. 4d. to 3s. 3d., and thus make statutory the arrangement come to between the Gas Light and Coke Company and the London County Council with regard to the charge for meter rent already mentioned. The London County Council presented a petition against the Bill in the House of Commons, and an important clause in their petition marked a further step in the history of this matter, because the London County Council contended that the time had now come when the standard of calorific power should be fixed, and that its maintenance should be attended with penalties. The City of London Corporation also petitioned against the Bill on similar grounds, with the result that the Gas Light and Coke Company and these two opponents carried on negotiations which resulted in amendments of an important character. The first provided for a test of calorific power with penalties, and this was the first instance in parliamentary history of a calorific power test with penalties being imposed. The Act also provided that the standard price should be 3s. 2d.; this being conceded because the London County Council argued that by reason of the reduction in candle power there would be a reduction in working expenses, and that they, as representing the consumer, should have the benefit of this. Section 39 of the Act of 1909 provided for a calorific standard of 125 calories, and a minimum of 112½ calories for the purpose of penalty. A calorie, he might explain, represented the quantity of heat required to raise the temperature of one litre of water one degree centigrade. Sections 40, 41, and 42 prescribed the conditions of the test, while the authorities concerned were also given power to apply to the Board of Trade to vary the standard of calorific power up or down. Thus the Company came under standards for both calorific and illuminating power, with penalties in each case. In that respect they were in an absolutely unique position; and the Act was the only one on the Statute Book which provided for both calorific and illuminating power tests with penalties. In 1911, the Gas Light and Coke Company took over the Barking, and Chigwell, Loughton, and Woodford Gas Companies, but no test for calorific power was prescribed in that Act.

There were still one or two items which he would mention to the Committee as showing how this movement had grown since then, because parliamentary history had shown that it had now not only recognized that the calorific test was an important element, but that there should be a standard prescribed with penalties. Since 1911, several companies had applied to Parliament, and the result had been that the calorific test had been substituted for the illuminating test with penalties. In 1911 the Wandsworth, Wimbledon, and Putney Gas Act was passed; and this was an Act by which three Companies were amalgamated. In respect of Wandsworth, which was within the County of London area, the Borough Council petitioned against the Bill, and asked for a calorific power test with penalties. The London County Council also asked for a calorific test. The result was that a provision was inserted in the Bill under which the calorific power test was substituted for the illuminating power test with penalties. The Act prescribed 136 calories gross, and 122 calories gross for penalties. He drew particular attention to this, because in the Gas Light and Coke Company's Act in 1909 the figures were 125 and 112½ respectively.

In order to explain the difference between calories gross and calories net, Mr. Lloyd read the following:—

> "By 'gross calorific power' is denoted the heating power of the gas when the steam generated from its constituents during combustion is condensed to water, and the water cooled to atmospheric temperature.
>
> "'By net calorific power' is denoted the heating power of the gas when the steam generated from its constituents during combustion is allowed to pass away and condense.
>
> "'Total gross calorific power' ought to correspond with gross calorific power as previously defined, but inasmuch as the usual forms of calorimeter are not fitted with automatic appliances to correct the incomplete saturation by water vapour of the air necessary for the combustion of the gas under test, the complete total gross units of heat capable of being developed are slightly understated. The total gross calorific power should include the heat units of the gas which have become latent in the water vapour completing the saturation of the surplus air and the non-condensable combustion products constituting the effluent gases passing away from the calorimeter."

They had, Counsel continued, adopted the gross in the present Bill as being a much more convenient figure. It did not necessitate calculations, and it did not vary as the other did. It was sufficient for his purpose to say that the Wandsworth Company's Act provided 136 calories gross and 122 gross for penalties. This Act was the first illustration of the calorific test provided in substitution for the illuminating test for penalty purposes. In the same year (1912) the South Suburban Company's Act was passed. It was a Bill to amalgamate the Bromley and Crays and the West Kent Companies' undertakings with the South Suburban Company. The London County Council again petitioned, and they again said that the time had come for a standard of calorific power to be adopted with penalties. The Council's petition put the matter so concisely that he would like to read a portion of it:

> Your petitioners submit that, in view of the increasing use of gas for heating purposes and for lighting by means of incandescent mantles, the time has now come when a standard of calorific power for gas should be fixed, and a provision should be inserted in the Bill making the South Suburban Company liable to forfeitures for any deficiency in such standard. A similar provision was made at the instance of your petitioners in the Gas Light and Coke Company's Act, 1909, and has also been inserted in the Wandsworth Gas Bill of the present session, and your petitioners humbly submit that provisions as to testing for calorific power should be inserted in the Bill now before the Committee.

Again it was the County Council who pointed out, and impressed on Parliament, and on the Company, that the time had arrived when, consequent on the increased use of gas for heating purposes and incandescent lighting, the calorific test should be imposed, and should be provided for with penalties. Upon the petition being presented, negotiations took place between the South Suburban Company and the London County Council, and the result of it was that a calorific standard was substituted for illuminating power with penalty, with the consent of the Company. When the calorific standard was substituted, it was provided in the South Suburban Act that the standard should be a standard calorific value of 540 B.Th.U. gross per cubic foot, and that the penalty limit should be 475 B.Th.U.

The CHAIRMAN: Did you not tell us just now that the figure was 136?

Mr. HONORATUS LLOYD: That is calories.

The CHAIRMAN: What is the difference between a calorie and a thermal unit?

Mr. HONORATUS LLOYD said: A calorie is the quantity of heat required to raise the temperature of one litre of water 1 degree centigrade. A British thermal unit is the quantity of heat required to raise 1 lb. of water 1 degree Fahr. Thus 3·968 B.Th.U. represents as nearly as possible 1 calorie, and 540 is therefore practically equivalent to 136 calories.

In 1913, he continued, there were three further Acts passed; this time in the Provinces. They were the Morley Corporation, the Porthcawl and District Gas Company, and the Redcar Gas Company; and in all these three Acts the calorific standard was substituted for an illuminating standard. In Morley and Porthcawl, the illuminating power test was abolished altogether. In the case of Redcar, they maintained the illuminating power of 12 candles, but without penalties. In Morley and Porthcawl, the calorific standard set up was 540 B.Th.U. gross and 475 net. In the case of Redcar, they took it at 125 calories

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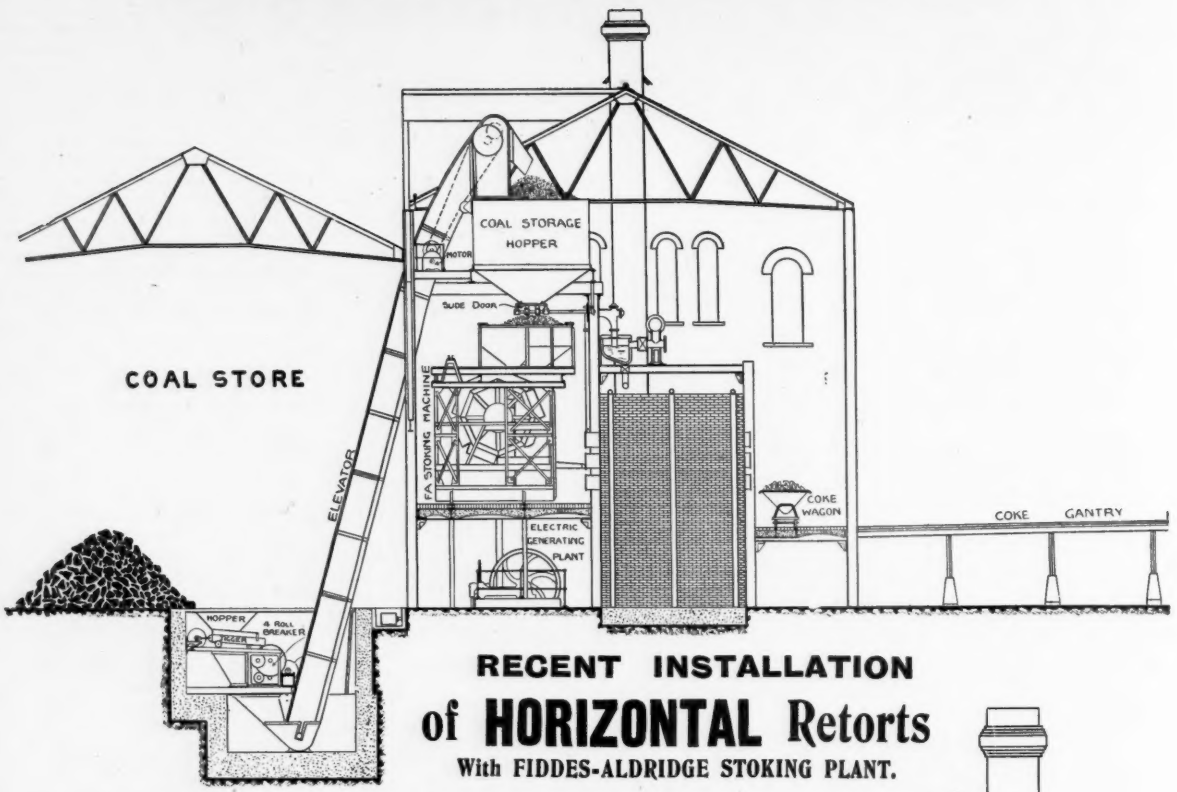

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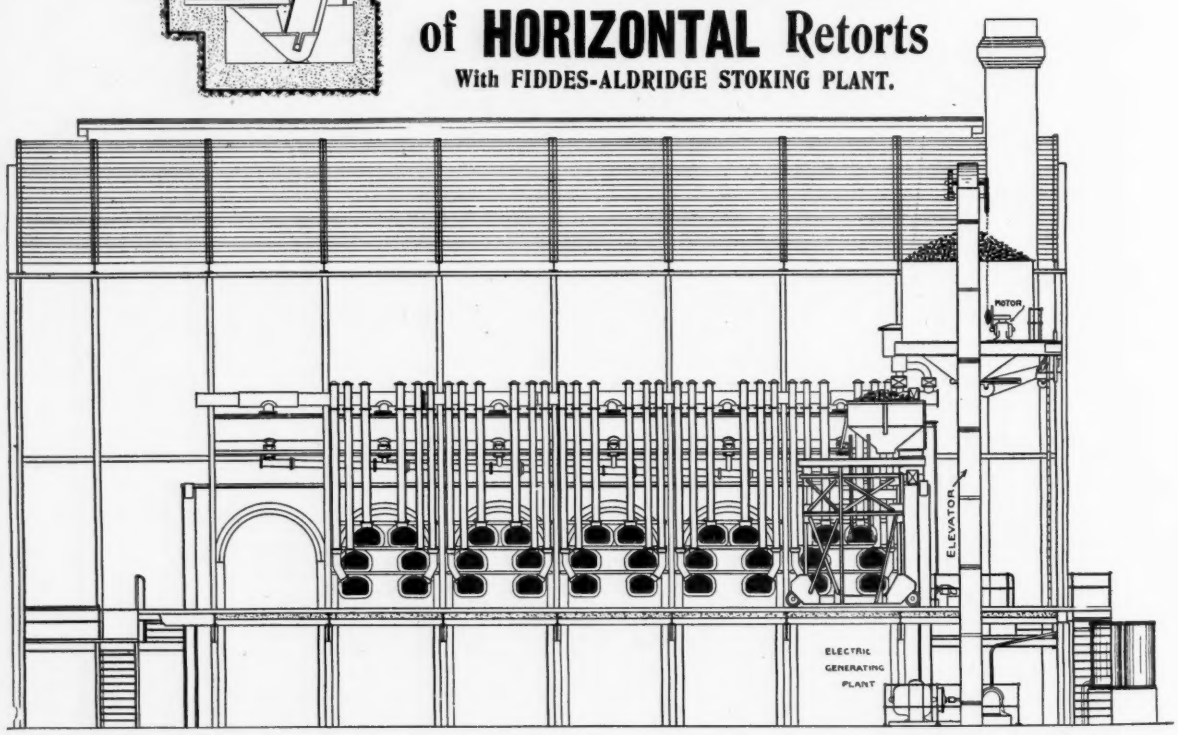

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net, and 112 calories net for penalty purposes. There were, therefore, now five Acts of Parliament in which had been substituted the calorific power test for the illuminating test for the purposes of penalties. In addition to this, there were pending before Parliament in this session seventeen Bills, in all of which proposals were made for the substitution of a calorific for the illuminating test. In all, or nearly all these Bills, many of which had been before one or the other House, it had been arranged by the parties that, rather than have an expensive and full-dress discussion on these Bills, this particular matter should be held up, and should be settled as their Lordships might decide, in the present important case.

It was in these circumstances that they were venturing to present the case that the time had now come, and had been recognized by Parliament as having come, when the calorific test is the one that should be adopted with penalties, and that the Gas Light and Coke Company should no longer be in the unique position of being liable for penalties in respect of both tests. The Bill provided that the standard of calorific power should be 540 gross and 475 net. He must say a word with reference to these figures in comparison with the existing figures in the Act of 1909—viz., 125 and 112½ net calories. The figures that they now proposed were slightly lower than the figures represented by 125 and 112½ net. At present their standard was 125 calories net. This was equivalent to 551½ B Th.U. gross. They were asking for that which was now accepted, and which was applicable to their particular gas—viz., 540. This was a reduction of 2·08 per cent. from the equivalent of 125 calories net. The present penalty figure, 112½ calories net, was equivalent to 496 B Th.U. gross. Again, they were asking for the figure which was really applicable to their gas, and which was uniform with the existing figure—475 B.Th.U. gross, and that gave 4 23 per cent. less than the figure in their existing Act.

There was another incidental matter to which he must refer. It arose under clause 16. In 1883, by an "Order in Council" which amalgamated the London Gas Company and the Gas Light and Coke Company, there was a provision that the Gas Light and Coke Company were not to charge south of the Thames a higher price for 16-candle power gas than the price which was charged by their neighbours, the South Metropolitan Gas Company for gas of the same candle power. Up to 1900, this condition of affairs existed; but in 1900, the South Metropolitan and the Commercial Gas Companies' standard was reduced to 14 candles. Nevertheless the Gas Light and Coke Company did more than loyally abide by their bargain, because they continued to supply 16-candle power, but charged no more for it than the South Metropolitan Company charged for their 14 candle.

The CHAIRMAN: Are you asking now for a reduction to 14?

Mr. HONORATUS LLOYD said no; but as they were seeking to abolish the illuminating test, they were also seeking to protect this district. In 1909, the Gas Light and Coke Company's candle power was also reduced to 14, and therefore the only alteration that was then necessary was to change the figure 16 in the proviso to 14, and then they continued to supply gas of the same candle power at the same price. Now inasmuch as they were asking to abolish the illuminating power, it would have the effect of rendering this particular section nugatory, and therefore clause 16 of the present Bill provided that the price of gas in South London should be the same as that charged by the South Metropolitan Gas Company without regard to illuminating power.

Counsel then proceeded to deal with the petitions which have been lodged against the Bill. He said that before introducing the Bill, the Gas Light and Coke Company thought it right to send out to the various authorities a statement with the view of removing some of the misapprehensions—as they thought them—which existed in the minds of the local authority. The statement was dated Jan. 29, 1914, and was in the following terms:

GAS LIGHT AND COKE COMPANY BILL.

With a view to removing the doubts which certain of the local authorities of districts within the Gas Light and Coke Company's limits of supply are understood to entertain as to the effect of the provisions of the Bill from the point of view of the gas consumer, the following points are submitted for consideration:—

1. The object of the Bill is to bring the enactments relating to the testing of the Company's gas into line with recent legislation on the subject as embodied in various Acts, of which that obtained by the South Suburban Gas Company in 1912 is an example, by—

(*a*) Dispensing with the illuminating power test as a test of the quality of the Company's gas;
(*b*) Adopting British thermal units gross per cubic foot as the denomination by which to define the calorific power of the Company's gas, instead of calories net per cubic foot as provided by the Company's present Acts; and
(*c*) Extending (subject to the last-mentioned amendment) the provisions of the Company's Acts relating to the testing of the calorific power of their gas to those parts of their limits of supply, formerly comprising the areas of supply of the Barking Gas Company and the Chigwell, Loughton, and Woodford Gas Company, in which those provisions are not now applicable.

If the Bill becomes law, the Company's gas will throughout their area of supply be required to conform to a specified standard of calorific power, but not of illuminating power.

2. In the first place, it should be borne in mind that, owing to the provisions of the Company's Acts under which, for each one-fifteenth per cent. by which they may increase their half-yearly dividend, they must reduce the price of gas for the whole of that half year by 1d. per 1000 cubic feet, the consumers are practically in the position of partners with the shareholders, and that, as one-fifteenth per cent. on the Company's ordinary stock amounts to less than £11,000 as compared with the £52,000 or thereabouts which the Company give up by reducing the price of gas for half a year by 1d. per 1000 cubic feet, the consumers as a class have a substantially larger interest in any economy which the Company may effect than the shareholders. If, and so far as, the Bill might enable the Company to reduce their expenses by relieving them from the necessity for enriching their gas, so as to attain or adhere to an unnecessarily high standard of illuminating power, the Bill would benefit the consumers.

3. The proposed new standard of calorific power is not the exact equivalent of the present standard, but is rather less than 2 per cent. lower. The reduced standard is that which has been applied by the recent legislation above referred to, and is, in the opinion of experts who have considered the matter from the point of view of the consumers as well as of the Company, such as to secure as great efficiency for all practical purposes as the slightly higher standard imposed upon the Company by the experimental provisions enacted for the first time in the Gas Light and Coke Company's Act, 1909.

4. Under present conditions the Company are throughout the whole of their limits of supply required to maintain a prescribed standard of illuminating power, and are liable to penalties for failure in that respect. Except in the districts formerly supplied by the Barking and Chigwell Companies, the Company are also under obligation to maintain a prescribed standard of calorific power, and are liable to penalties for deficiency in such power. In consequence of the almost universal adoption of incandescent burners for illuminating purposes, and of the very large extent to which gas is used for heating, cooking, and power purposes, the illuminating power of the gas supplied by the Company has become a matter of small importance as a measure of the value of the gas supplied to the public, while the maintenance of an adequate standard of calorific power has become increasingly important.

5. The Bill will confer upon the consumers in the Barking and Chigwell districts the advantage of a fixed minimum calorific power in the gas supplied to them, in exchange for which they will, in common with consumers in the remainder of the Company's limits of supply, give up the less valuable right to a fixed minimum illuminating power.

6. The Company have no intention of deliberately reducing the illuminating power of the gas supplied by them, and the gas will continue to be supplied of an illuminating power amply sufficient for lighting purposes even in the few cases where flat-flame burners are still in use.

7. Throughout the London portion of the Company's area of supply, the illuminating power of the gas is tested every day, and if at any one of the fifteen testing-places the illuminating power is shown to be below the standard to a given extent, the Company are liable to penalties, even though the same gas may be found by the examiners testing at other testing-places on the same day to be perfectly satisfactory. This occasionally obliges the Company to incur heavy expenses in avoiding a repetition of the adverse report of the examiner, and thus to impose on the shareholders and their partners, the consumers, a burden which in nearly every case does not produce any advantage. This is not merely a London question, for the bulk of the gas supplied and tested in London is manufactured at works outside London, at which a large proportion of the gas supplied in the suburban areas is also manufactured. Moreover, the consumers in the suburban areas are prejudicially affected by any avoidable expenditure of the Company in respect of the London area, in so far as it tends to prevent a reduction in the price of gas, whether they derive any advantage from the results of the expenditure or not.

8. The alterations which the Bill will effect will place the Company and their consumers under the same conditions as were applied in 1912 to the South Suburban Gas Company and their consumers. In the present session of Parliament several existing gas undertakers are applying for similar provisions, and in some cases in which new undertakings are sought to be authorized it is proposed to establish the undertakings on the same lines.

Counsel (continuing his address) said he was afraid that the hope that this letter might remove some of the objections which were entertained had not been very successful.

The petition of the London County Council contained the following paragraph:

> Your petitioners would point out that the standard of calorific power proposed by the Bill is a lower one than that agreed with your petitioners in 1909, and will enable the Company to supply gas of an inferior heating quality to that which they are now by law required to supply, with the result that the consumers will suffer by having to use more gas than they are at present using, in order to obtain the same results.

It was quite true that the standard was lower, but the figure was fixed in the experimental stage of this question, and was too high. It was equally true that more gas would have to be used to produce the same result, but the difference was so small that the amount was absolutely negligible, and nobody would notice it. The petition went on to say:

> Your petitioners would also draw attention to section 42 of the Act of 1909, which provides that either the Company or your petitioners may give notice to the Board of Trade desiring that the standard of calorific power may be raised or lowered, and empowers the Board of Trade to reduce or increase the said standard, and to make any such modifications of the Act of 1909 as may be necessary.

This provision had been reproduced in the present Bill, so that the position in that respect was not altered at all. In the next paragraph the County Council said:

> Your petitioners most humbly submit that the parliamentary bargain made in 1909 ought to be adhered to; that there is no justification for the proposed lowering of the calorific standard; and that even if there were any justification (which your petitioners deny), the proper course would be for the Company to apply to the Board of Trade in that behalf under section 42 of the Act of 1909.

He did not like the word "bargain," because it rather suggested that they had, or might have, been guilty of some breach of faith. It was quite true that in the experimental stage of this question they agreed to the figure, subject to any raising or lowering by the Board of Trade. The proviso showed that it was never intended by either party to be final. As to the suggestion that they should apply to the Board of Trade, he had to say that, inasmuch as they were anxious to come to

Parliament to have the question settled whether or no the substitution of a calorific test for the illuminating test should take place and the illuminating test be abolished, it was not worth while going to the Board of Trade to ask for the other matter, and so take two bites at the cherry. The petition proceeded :

> Your petitioners strongly object to the removal of all restrictions as to illuminating power to which the Company are now subject, and they would point out that the three Companies are all subject to such restrictions, and that if any such claim is to be made at all it ought to be made in an Act applying to all three Companies.

This was a rather curious paragraph, because it was at the instance of the London County Council in one of the Bills, and at the instance of a Borough Council in the other, that the calorific test was substituted for the illuminating test.

Mr. FREEMAN : I think that is not quite accurate.

Mr. HONORATUS LLOYD replied that he thought it was, and he had already read the quotation from the London County Council petition in which the point was raised. So that there should be no doubt about the matter, he would refer to the report of the Parliamentary Committee of the London County Council, which showed what they did do. The report referred to the Wandsworth and the South Suburban Gas Bills, and proceeded :

> "The Wandsworth Borough Council, however, decided to oppose the Wandsworth and Wimbledon Bill with the object of securing the insertion of amendments setting up a standard of calorific power with penalties for deficiencies; and the Council, on the 27th of February, 1912, consented to allow their Chemist to give evidence in support of the Borough Council's case. The promoters, however, agreed to insert the amendment desired. The Bill, as amended, also provides that the test for illuminating power shall cease for the purpose of penalties, but it shall be continued for information. After consultation with the Public Control Committee, we have decided to press for the insertion of similar amendments in the South Suburban Gas Company's Bill with the object of securing uniformity with regard to these matters. As the result of negotiations with the promoters, we have obtained the insertion of a clause providing for the application in the area of supply within the County of London of a calorific test similar to that provided in the other Bill, the standard being 540 B.Th.U. gross, which is equivalent to 136 calories gross, and for penalties 475 B.Th.U. gross."

The next paragraph in the petition referred to sulphur impurities. He did not know whether this was a matter that was being pressed. It was raised in other petitions; but he had been informed by his learned friends that they were not pressing the matter.

Mr. FREEMAN : I am not going to suggest any amendment of the Bill so far as sulphur impurities are concerned. The object of this paragraph was merely to serve as an illustration. The Company had certain privileges in regard to sulphur impurities, and certain results have followed, and therefore they thought they ought not to have certain privileges in regard to other matters.

Mr. HONORATUS LLOYD said he could only say that exactly the results had followed which the Departmental Committee knew would follow, and with the knowledge and information they had they intended the results to follow which had followed, and the Company had been guilty of no shortcomings at all.

Dealing next with the petition of the Corporation of the City of London, Counsel read the following paragraph :

> Your petitioners further submit that in the interests of gas consumers the existing test of calorific value should be preserved, and should not be reduced as proposed by the Bill, and that forfeitures should follow infraction of the same by the Company. Should abolition or reduction of either of such standards be sanctioned, the pecuniary benefit resulting therefrom should, your petitioners contend, be secured to consumers by a reduction of the standard price; and, further, that in the event of any alteration of the standard of illuminating power being approved, the Company should be required to supply at its own cost suitable burners for use by the consumers under the altered conditions.

The altered condition of working, Counsel said, would be such that it would not justify, and could not justify, figures which would represent one penny reduction. For his learned friend to suggest that the whole saving should go to the consumer was a little hard, when it was borne in mind that, by the operation of the sliding-scale, if there was any economy which resulted in the Company being able to reduce the price of gas, the consumer got five-sixths of the benefit and the shareholder only one-sixth. He should certainly ask the Committee not to interfere with the standard price, which was the cornerstone on which the whole capital of the Company was raised. It was worthy of comment that the London County Council, who generally went into these matters pretty closely, did not make any such suggestion as this. The Corporation also urged

> That the standard calorific value should be a specific or fixed standard, and that no margin or allowance beneath that standard should be permitted, and that forfeiture should follow any breach of the same.

To that he would merely reply that it had been thought right, both in respect of illuminating power and of calorific power where it had been adopted, to provide a standard with a view to working up to it, and a further standard below which penalties should arise.

The other petitions against the Bill were on similar lines, and finally Mr. Lloyd drew attention to the following report by the Board of Trade, addressed to the Lord Chairman.

MEMORANDUM OF THE BOARD OF TRADE ON THE CALORIFIC TEST FOR GAS.

[*Addressed to the Lord Chairman.*]

It will be observed that of the eighteen Bills which provide for calorific tests, all but one also provide that the undertakers shall not be subject to an illuminating test. The Board of Trade are of opinion that it might be well if the Committees to which these Bills are referred were to ascertain what proportion of the gas manufactured in each area is still used in the old fashion, most commonly with flat-flame burners, in which light depends on the intrinsic illuminating power of the gas, before relieving any undertaking from all responsibility in respect of illuminating power. Even if the undertakers are relieved from penalties for deficiency in illuminating power, it might be well to retain the test for the information of the public authorities. Representations have been made to the Board of Trade that the abolition of the illuminating test will enable undertakers greatly to increase their revenues by extracting the benzol from the gas, and that therefore, in cases where the illuminating test is abolished, the maximum or standard price of gas should be reduced. The Board of Trade suggest that this point might be considered by the Committees to which the Bills are referred.

With regard to the test for calorific power itself :

(1) There is a good deal of variety in the terminology of these Bills. In most of them the test is stated in British thermal units (B.Th.U.) *gross;* but one of the Bills mentions calories (net), and some of them B.Th.U. net. The Board are advised that the calorific value should be expressed in B.Th.U. *gross* in all cases.

(2) The Board of Trade observe that the Bills agree in the following respects :—

(*a*) There is a *standard* calorific value (*e.g.*, 540 B.Th.U.). The undertakers are not liable to any penalty for falling below this, but it is presumably meant that they ought to approach it fairly nearly.

(*b*) There is a minimum—*e.g.*, 475 B.Th.U.—to which they must attain. If they fall below this, they are liable to penalties graduated according to the magnitude of the deficiency.

The Board of Trade are aware that there are provisions to this effect in the Gas Light and Coke Company's Act of 1909. They are, however, of opinion that, at the present time, it would be better to fix a minimum only, and to provide that undertakers shall not be liable to penalties for a deficiency of less than (say) 5 per cent. The actual figures of the minimum must, in the opinion of the Board of Trade, be fixed according to the circumstances of each undertaking; but for the guidance of Committees, the figure (500 B.Th.U. *gross*) might be printed in italics in a model clause.

Company.	Average.			Maximum.			Minimum.		
	1911.	1912.	1913.	1911.	1912.	1913.	1911.	1912.	1913.
Gas Light and Coke (B.Th.U. gross) .	546	537	540	609	590	641	507	491	502
South Metropolitan (B.Th.U. gross) .	574	569	571	636	648	636	530	523	531
Commercial (B.Th.U. gross)	544	540	537	604	601	584	490	484	488

(3) The Bills also provide that if the gas falls below the minimum by more than a certain amount—*e.g.*, 28 B.Th.U.—there shall be another test on the same day, and the average of the two tests shall be deemed the calorific value of the gas on that day. If the gas falls below the minimum by less than the same amount, there shall be a test on each of the two following days. The average of the three tests shall be the calorific value of the gas. [In two of the Bills it is provided that, when the gas falls below the minimum, a three days' average shall always be taken, but that if on any one of the three days the gas falls below the minimum by more than a certain amount, there shall be two tests on that day, and the average of these two tests shall be deemed the calorific value of the gas on that day.]

The Board of Trade are aware that there is a precedent for these provisions in the Gas Light and Coke Company's Act, 1909, but they are disposed to regard them as unduly favourable to the undertakers. All the Bills save them from penalties for unavoidable deficiency, and, as has been said, the minimum to which they must attain is fixed well below the standard to which presumably they ought to attain. They should, therefore, in the opinion of the Board of Trade, be prepared to abide by one test, or, if the gas falls below the minimum by more than 28 B.Th.U., by the average of two tests on one day.

The Board suggest, having regard to the experimental character of the provisions now proposed to be made as to the testing of gas, that the Bills should contain a saving clause to the following effect :—

> "Nothing in this Act shall exempt the company or their undertaking from the provisions of any General Act relating to the supply of gas which may be passed in this or any future session of Parliament."

After the luncheon interval, the Committee witnessed a demonstration of testing in the adjoining room.

Evidence was then called in favour of the Bill.

Sir CORBET WOODALL, Governor of the Gas Light and Coke Company.

Witness said that the Bill, if passed, would enable the Company to practise economies which would tend to reductions in the price of gas. He regarded the illuminating value test as quite unnecessary in the present circumstances of the use of gas in conjunction with mantles for lighting, and also for heating, cooking, and power purposes. The question of luminosity was of no importance except to those who used flat-flame burners, of which there were still a few in use. The gas used in this way, however, represented less than 5 per cent of the gas sent out—probably 3 per cent.; and it was mostly used in burners fitted for safety purposes rather than actual illumination, as, for instance, in passages. The chairman of a gas committee in the provinces had recently told him that out of 20,000 consumers, there were in his district only 14 using flat-flame burners. Ignorance was mainly the cause of the continued use of flat-flame burners, as mantles were much cheaper to use from the point of view of the gas consumed. He handed in a diagram illustrating the economy of using incandescent mantles. From 1000 cubic feet of gas 2000 candle power could be obtained with flat-flame burners; whereas with high-pressure gas and inverted mantles, the same quantity of gas would give 60,000 candle

power—the respective costs with gas at 2s. 6d. being 15d. and ¾d. It was in the Company's interest to promote satisfaction among its consumers; and therefore it was not likely they would do anything to alienate them. Consequently, though the Company were asking for the illuminating test to be abolished, it was not the intention to alter in any way the methods of manufacturing gas. The object was to save the considerable waste arising from the illuminating test; and the object of asking the Committee to witness some tests was to illustrate how easy it is for observers to obtain varying results with the same gas. Fifty per cent. of the gas manufactured at Beckton was tested at a large number of different testing-stations, and difficulties and expense had been involved due to this fact. If the calorific value set out in the Bill was maintained, there would be no perceptible difference in the illuminating value. As an example of this, he mentioned that, during the coal strike of 1912, it was naturally essential that the coal should be made to go as far as possible, and for two months the Company's engineers were instructed to disregard the penalty in their Acts of Parliament, and to get the utmost out of the coal. This was after consultation with the London County Council; and the result was that the Company got 6 per cent. more gas out of the coal.

But the reduction in the calorific value was only 2 per cent., while the alteration in the illuminating power was negligible, being 0·14 candle. The freedom from responsibility, not of the penalties in the sense of money, but from the reproach of being below the standard, resulted in a saving of 65 000 tons of coal to the Company during these two months; and the effect of this Bill would be very much the same as during the strike period. The accuracy of the illuminating test depended upon many factors, not the least being the atmosphere, and the health of the observer in relation to his eyesight. Owing to one of the testing-stations, at different times, sending in bad reports of the gas, the Company had had to fall back upon what he termed extraneous methods for maintaining the illuminating value, at very considerable expense and inconvenience, by enriching the gas. The test of calorific value was not subject to the changes he had mentioned, but it determined the true value of the gas for the purpose for which it was to be applied. Again, gas was now being required in very large quantities for industrial purposes, and it was desirable to exercise every economy in order that it might be offered cheaply. Any increased dividends would be to the benefit of the consumers, the shareholders, and the employees as co-partners.

With regard to the suggestion in the petitions that the standard price should be reduced, he had the strongest possible objection, and regarded that as being a backward step. The Company had the inducement of the sliding-scale to keep the price of gas to the lowest possible; and to alter the basis of the sliding-scale would be to alter the contract made between the representatives of the public in 1909 and the Company, and which had been loyally abided by until now. That the Company always did reduce the price whenever possible was shown by the fact that, in spite of the increased cost of materials during recent years, the price had just been reduced. The Company were desirous of a slightly lower standard than now, but it was not of very great consequence. The Board of Trade had suggested that there should be a margin of 28 units. He had not had time to carefully consider the suggestion; but at the moment he could see no reason against it. The reason why he welcomed a reduction in the present standard was that, ever since it had been imposed, the Company had been living on the margin allowed below the standard. The test was agreed to under protest; and it was felt that the figure was one which could never be lived up to. He did not expect to be able to, and therefore it was desirable to fix figures which could be worked to normally. The whole experience of the test was that 90 per cent. of the tests made had shown the gas to be below the standard. Indeed, it was more or less understood between the County Council and the Company that the test would never be maintained so far as the 125 calories was concerned. Referring to the Leyton Council's petition, which suggested that the Company, by abolishing the illuminating power test, might send out an odourless gas which would be a danger, Sir Corbet said there was not the slightest possibility of doing so without altering the whole of the works to do it.

Witness Cross-Examined.

Mr. Freeman cross-examined on behalf of the London County Council. His first point was that, so long as flat-flame burners are in use, the illuminating test should be retained. There was, of course, disagreement between witness and Counsel as to there being a substantial number of flat-flame burners in use nowadays.

Such a gas as you would be able to supply under the Bill would be practically useless for flat-flame burners?—Oh no.

The Chairman: The witness has told us that the luminosity would not be affected.

Mr. Freeman put further questions intended to show that the object of the Company was to keep the gas constantly at about the 475 limit, but Sir Corbet said that the present average of about 540 would be maintained—at any rate, something well above the 475 minimum limit.

The Chairman: Could you get the same luminosity if you reduced your calorific value to 475?—No. I think then there would be some reduction.

Mr. Freeman: It would be very substantially reduced?—No, it would not; but I would rather leave that to the engineer who has made some tests.

In 1909, the standard was fixed, and the only way to vary it was to go to the Board of Trade. The question we are dealing with is of a highly technical character?—Yes, but a very simple one.

It may be to you, but to nobody else. Can you imagine a question which could be more properly and suitably decided before a tribunal which would be appointed consisting mainly of experts, as the Board of Trade would have done?—I do not see the necessity for it for a moment.

And the only reason why, as you say, you did not go to the Board of Trade was because you wanted something more than the modification of your thermal standard?—Yes, and something of much greater consequence.

Will you tell me what benefit the public are going to get if your Bill passes?—Every change that we can make which tends to reduce the price but not the quality of gas benefits in a very large proportion the consumers.

If I am right when I suggest that the effect of your Bill would be that everybody to get the same amount of light would have to buy and pay for a good deal more gas than now, then the public do not get the benefit?—If the quantity they bought were greater than the saving they effected, then you would be right.

Mr. Freeman next put questions to ascertain that the Company have fairly constantly been supplying a gas of 540 B.Th.U., even during the coal strike, and that, although the calorific standard had been complied with, the illuminating power had at times been below the standard. This Sir Corbet agreed with. Asked as to why, in these circumstances, it was desired to reduce the calorific standard, witness again said it was to keep in conformity with recent legislation.

Would not gas manufactured at 475 B.Th.U. contain an increased amount of incombustibles?—We are not asking for 475 B.Th.U. Our present mean is 540 B.Th U., and we intend to maintain that.

Would it not be possible for a gas at 475, which would enable you to comply with your standard requirements, to have no luminosity in a flat-flame burner?—No.

Would not it be possible?—No, I do not think it would be at all possible with gas made from coal. I do not think the companies are being treated quite rightly. We want to make a prosperous business, and to do that we have to satisfy the requirements of the customer. Are we likely to reduce either the calorific value or the illuminating value so as to choke-off consumers?

You have been very desirous of choking-off the flat-flame consumer for some time?—Indeed we have not. All we want to do is to teach him to use something better.

Cross-examination on behalf of the Leyton, Willesden, and Ilford Councils was largely directed to showing that quite a large proportion of gas consumers in these districts still use flat-flame burners. At Ilford, the figure was put at one-fifth. This figure was disputed; and in Willesden Sir Corbet Woodall said there were only 4000 slot-meter consumers, as against 250,000 ordinary meters.

Mr. Munroe, for the Leyton Council, put it that with the abolition of the illuminating power test the flat-flame burner user had no certainty that the illuminating value would be maintained. At present, in order to satisfy the illuminating test, a certain calorific power had to be maintained; but this necessity would not arise if the illuminating power test were to go.

A discussion took place as to the diminution in candle power with gas at 475 B.Th.U. Sir Corbet Woodall dissented from the view that the Company would make a practice of always keeping the gas at this value; but for the purpose of argument, assuming they did, the candle power of the gas would be about 6½ at the burner against 8 to 9 with 540 B.Th.U., which is the present average. Mr. Munro said his instructions were that the candle power would drop to between 3 to 4.

Mr. Munroe: I suggest you will drive out the flat-flame burner user if you cut down his candle power.

Sir Corbet Woodall: It is for his good. We shall teach him the gospel of cheap light.

Mr. Rowland Berkeley, for the Willesden Council: Would you have any objection to having the illuminating test for the purpose of any foolish and improvident burner, but without penalty?—I object, because I think it is unnecessary. You can always make a test if you choose.

I should be content with a testing clause without penalty?—That is for the Committee. I would regret it, because I want to see the test banished altogether.

The Chairman: I do not know what the object of this cross-examination is.

Mr. Rowland Berkeley said his suggestion was that it would pay the Company, from the commercial point of view, to absolutely destroy the illuminating value of the gas, and even pay a considerable penalty under the calorific clause to do this.

Sir Corbet Woodall: Surely you cannot suggest that seriously; that in order to save a little money, we should spoil the value of the gas altogether.

Mr. J. D. Fitzgerald, K.C., also cross-examined on behalf of the City of London Corporation. Sir Corbet Woodall stated that the ordinary percentage of water gas was 20 per cent., but just at present it was about 25 per cent., owing to the price of coal, while oil at the moment was a little cheaper. He would not agree that with only a calorific test it would be unnecessary to enrich the gas to the same extent as at present.

Mr. Fitzgerald: I suggest that you would be able to mix unenriched water gas with the coal gas?—Then you would be entirely mistaken.

And that the effect of this would be to largely increase the carbon monoxide in the gas?—No, it would only increase the carbon monoxide if we increased the percentage of water gas.

Carbon monoxide is a deadly poison?—The number of cases of it acting upon consumers of gas is very small. Liverpool has been supplied with nothing but water gas for quite a long period, and I have supplied one works in my district with nothing but water gas for a good long period.

But you don't let them know it?—Oh no. [Laughter.]

Counsel then suggested that the Company was endeavouring to alter the settlement of 1909 without consultation with the London County Council and the City of London Corporation. Sir Corbet, however, pointed out that the Company had met the officers of the London County Council, and to an extent officers of the City Corporation.

Mr. Fitzgerald: The arrangement of 1909 is being upset for your own advantage, and you are offering the public nothing in return?—Yes we are. Our object is to enable us to make gas equally useful at a less cost, and so benefit the consumers.

The real standard you want to work to hereafter is 475 B.Th.U.—Emphatically no.

The Chairman: I do not think you need continue this, Mr. Fitzgerald, because we have had it all before.

Mr. Fitzgerald concluded his cross-examination by suggesting that another advantage to the Company would lie in the value of the benzol which could be extracted.

Sir CORBET WOODALL replied that this would not be an advantage, as it would lower the value of the gas more than the return would be on the benzol.

The CHAIRMAN: Is it your intention to work below 490?—No.

You propose to work at the same standard as you do now?—Yes.

Wednesday, April 29.

RE-EXAMINATION OF SIR CORBET WOODALL.

Sir *Corbet Woodall* was re-examined by Mr. BALFOUR BROWNE this morning. Attention was called to the fact that the proportion of the total gas supplied by the Company in 1904 used in flat-flame burners was 50 per cent., whereas now it was nearer 3 per cent. With regard to the argument that it would be to the Company's advantage to work to the minimum figure of calorific value—namely, 475—experience and the Board of Trade reports showed that the Company had worked far above the penalties in the past, and that over 90 per cent. of the tests taken of the Company's gas showed that it was close up to the 540 B.Th.U. standard. But the margin proposed in the Bill was considered necessary in order to allow for the difficulties in maintaining an absolutely uniform quality of gas from day to day and hour to hour. The Board of Trade, however, suggested the standard should be 500.

The CHAIRMAN: I do not understand from that suggestion that the Board of Trade consider the standard should be 500. I think that is merely a suggestion for a model figure.

Mr. BALFOUR BROWNE: Yes, I think it is; but I was going to ask Sir Corbet Woodall, supposing the Committee take this suggestion and put 500 B.Th.U. upon the Company, with a margin of 5 per cent., if he thinks he can work up to that standard.

Witness: Certainly.

The CHAIRMAN: But the figure of 500 goes down to one which the Company have hardly worked to up to the present.

Witness agreed that this was so, and thought that the standard should be such as to cover the Company against costly failures due to circumstances over which they had no control. If the Company had 500, with a margin of 5 per cent., this practically gave the 475 minimum asked for. As a matter of fact, any reasonable figure could be imposed so long as there was a margin of 5 per cent. The Company always regarded the maximum as the standard, and looked upon it in the light of humiliation if they found themselves below the maximum.

Then you do not mind what the minimum is?—Yes, I do, because we must have some margin.

In answer to further questions in re examination, witness dealt with the suggestion that the illuminating test should be continued for the purposes of information, but without penalties. He saw no reason for this, and pointed out that it had not been imposed upon the South Suburban Company or the Morley Corporation, nor in the Porthcawl case. The whole practice throughout the world was tending more and more towards the abolition of the illuminating test. In Germany, Canada, and other places abroad this was specially so. The illuminating test was vanishing.

Lord GORELL asked if a 520 standard would be a reasonable figure with a 5 per cent discount. This would bring the Company below the present penalty standard, and considerably below the average of the tests maintained by them in the past.

Witness thought that a 520 standard would be cutting it very fine.

Lord GORELL said that he regarded the 500 B.Th.U. suggested by the Board of Trade as a tentative figure to be adjusted by the circumstances of each case. He had been trying to see how the circumstances of each case applied, and then to put to Sir Corbet Woodall a figure which appeared to him a right one.

Mr. BALFOUR BROWNE: You are really applying the circumstances of this case as they were in 1909.

Lord GORELL: In the light of the figures you have worked to since.

Mr. BALFOUR BROWNE: In 1912 we fell below the figure of the average minimum.

Witness claimed that the working of the Gas Light and Coke Company was beyond reproach, and that therefore the Committee need not cut the Company down to the lowest possible limit.

Lord GORELL: What is passing through my mind is the reasonableness of some minimum figure; and it strikes me that 500 is too low. You have been almost always up to 540; and I only put 520 tentatively as the figure that might fairly form a basis of discussion, in order to arrive at a figure which would be a definite standard, and not an ebb-and-flow standard, as the present two figures are.

Witness said that at present the Company had 540, with a 10 per cent. margin; and he did not like the idea of their setting an example which was likely to be followed by others, because they would then be not only introducers of a calorific test, but also the introducers of a downward scale of margin. He would be willing to take 510 with a 5 per cent. margin and a three days' average. He would not ask for the average to be two days after the penalty stage, but the day before and the day after.

The CHAIRMAN: If you are granted 510 with 5 per cent., what standard would you work to as a matter of fact? Would you work to 510, or something above?

Witness: We should probably work above 510 for a great portion of the time.

You would drop 30 points then from 540?—No, we should make no alteration in the present system. We have no intention of sweating the coal to such an extent.

Where, then, would your economy come in as one of the conditions of this Bill?—It is by abolishing the illuminating power test.

Then it would seem, if you get rid of the illuminating power test, you do not mind very much about the alteration in the calorific test.

Mr. THOMAS GOULDEN, Chief Engineer to the Gas Light and Coke Company.

Witness confirmed the previous evidence as to the want of necessity for the illuminating power test, and also as to the differences obtained at the various testing-stations from the same gas manufactured at Beckton.

Mr. FREEMAN, in cross-examination on behalf of the London County Council: Would you be content to do this: Have at one end of your scale the figure which you have been in fact working to—536 to 540—and allow a margin of 5 per cent. for casualties so to speak?

Witness: I could not accept that, because we must allow for inevitable differences in the composition of our gas.

For a considerable time past you have been working to an average of 536, and Sir Corbet Woodall told us that he hoped and intended to keep up to the same quality of gas as in the past. You agree that 5 per cent. margin is ample. Why not start with the figure which in fact you have been working to, and take the margin of 5 per cent.?—I did not say it would be 5 per cent. margin on any figure.

In answer to further questions, witness said that gas with a calorific power of 540 B.Th U. corresponded to a candle power of 14½. But he would not agree that it would pay the Company, after having abolished the illuminating power test, to deprive the gas of all its illuminating power. This would be the first step towards commercial suicide, because it was not only necessary to keep up the quality of the gas for the purpose of the 5 per cent. of flat-flame burner users—it was also necessary to maintain it for the purposes of heating and cooking. The most that would be done under the Bill would be to reduce the candle power of the present flat-flame burners by 2 candles; but the Company would provide suitable burners for the quality of gas then supplied. This, of course, was on the assumption that the Company would work to the lower limit of 475 B.Th.U., which there was not the slightest intention of doing.

Mr. COURTHOPE MUNROE, for the Leyton Urban District Council, repeated his questions put to Sir Corbet Woodall—that a 475 B.Th.U. gas would reduce the candle power on the flat-flame burner to between 3 and 4 candles. Mr. Goulden gave similar answers to the previous witness—namely, that the gas would be reduced to about 6½ candles, but that suitable burners would be provided to suit this lower candle-power gas. He could not, however, imagine a person being such a blockhead as to use flat-flame burners.

The CHAIRMAN: But suppose he is a blockhead, this gas would give him 3½-candle power?

In answer to Mr. ROWLAND BERKELEY, for the Willesden Urban District Council, witness stated that the Company would supply one incandescent burner to slot-meter consumers, and replace their flat-flame burners by those of a more modern type.

Mr. PITMAN, on behalf of the promoters, said that he was willing to include in the Bill clause 43 of the Gas Light and Coke Company's Act of 1909, relating to new burners. Neither Mr. Berkeley nor Mr. Munroe was satisfied with this, however. Both said that the Company should replace all the flat-flame burners by incandescent burners. This, however, witness could not assent to.

Mr. BERKELEY, quoting figures from the London County Council report on the calorific value and candle power of gas manufactured since 1909 by the South Metropolitan Gas Company and the Gas Light and Coke Company, pointed out that all through the former supplied a higher candle-power gas than the latter. This, however, witness pointed out was because the South Metropolitan Company chose to make a 15½-candle gas, whereas their standard was 14. On the other hand, the Gas Light and Coke Company preferred to work to their standard of 14-candle power.

Mr. BERKELEY: May I suggest that it has reference to the way in which the gas is made—that the South Metropolitan gas is pure coal gas, and yours is water gas mixed with coal gas?

Witness: That is so.

And the water gas mixed with coal gas is giving a worse result?—Oh, no.

Do not these figures show it?—No. They show, as a matter of fact, that the South Metropolitan Company chose to make a gas at a higher candle power than their standard.

That is not the point!—That is the whole point. It would be the easiest possible thing for us to manipulate the water gas to give a higher candle-power.

Counsel put further questions to illustrate the possibility that the Gas Light and Coke Company would work to the lower limit of any standard which they were granted.

The CHAIRMAN: The whole history of this Company is entirely contrary to the suggestion that they will go down to the lowest possible standard.

Mr. BERKELEY replied that, under the present system, the Company could not go down because there was the illuminating test to maintain. But if they abolished the illuminating test, then there would be no check upon their going down to the lower limit.

The CHAIRMAN: That is true; but they can go down now much lower than their average figures show.

Mr. COURTHOPE MUNROE, for the Leyton Council, raised the question as to what Mr. Pitman really intended when he offered section 43 of the Act of 1909.

The CHAIRMAN: Witness has told us that he will supply one incandescent burner, and suitable flat-flame burners elsewhere in the house.

Mr. MUNROE: That is not quite the same thing as clause 43.

Mr. TINDAL ATKINSON, on behalf of the Ilford Council, asked, assuming some process were invented which would give a higher calorific value with a less illuminating power, what would be the incentive to the Company to work above the lower limit.

Witness replied that it would not pay the Company to do this if they wished to keep their customers, as for gas-engine practice and heating and cooking it was necessary to maintain a certain quality of gas.

In re-examination, witness said it would be impossible commercially to make a non-luminous gas with a high heating effect. He would not be able to do it if he were asked. It could be done by stripping the gas of all the benzol; but it would not be a business policy to do this. If he stripped the gas of all the illuminants, it would reduce the calorific value by 6 per cent.; but so long as the calorific standard was kept up, there was no practical method of depriving the gas of its luminosity.

The CHAIRMAN: What would you say would be a fair margin with a 520 standard?

Witness: I should say 8 per cent.

Mr. PITMAN at this point said the promoters were desirous of calling Professor Boys, who was a Gas Referee; but owing to his *quasi*-official

position it would be impossible for the promoters to examine him. Professor Vernon Boys was in the room under an Order of the House; and perhaps the Chairman would be good enough to allow him to go into the witness chair and give information to the Committee.

Professor VERNON BOYS, a Metropolitan Gas Referee.

The CHAIRMAN: The ordinary standard at which this Company has been supplying is about 540 B.Th U. In the ordinary testing that takes place in gas supplies do you find they fall very much below 500?

Witness: They vary between the nominal value and the penalty value a good deal; but they very rarely reach the penalty value.

What have you found is the least satisfactory standard at which gas is supplied?—From the point of view of the user, the more heat you get, the better; and it is the heat that you pay for. It is the one thing that can be measured in a manner which is entirely natural and correct. This question is distinct from the empirical method of testing gas for its illuminating power, where the whole of the method is arbitrary. But, in a way, I should not like to say that there was any one particular heat standard of gas that was a natural standard. The more you get, the better. If you get less heat, and you pay less, you are equally satisfied.

With regard to the illuminating test, as an expert do you consider yourself absolutely accurate in the tests that you take?—"Absolutely" is a strong word. Nothing is that. The illuminating power tests, although they are empirical, are satisfactory tests. They can be made with an accuracy considerably greater than 1 per cent.—½ per cent. is the accuracy that can be worked to tests for illuminating power.

Supposing you and one other equally expert tester were put on to the same gas, would you probably get approximately the same value?—Discrepancies of more than one-fifth of 1 per cent. on a number of tests are practically unknown.

Then you regard it as a satisfactory test?—Perfectly satisfactory. It is more difficult; but with the proper equipment, and in the proper place, the test is one which can be carried out with more than reasonable certainty.

The practice of Parliament has been to do away with the illuminating tests. Do you consider that, in view of the present position of the consumption of gas, it is any longer of value?—I entirely agree with that attitude. I think the illuminating power test has lost its value. Even if it cannot be abolished all at once, its unimportance is so patent now that this is a move entirely in the right direction.

Do you see any advantage in keeping up the illuminating test if there is no penalty?—I think it will be desirable to know what kind of illuminating power has been obtainable, for information, which will be useful, just as the test for information with regard to sulphur is made for purposes of reference at the present day. So long as the consumer gets heat for money, it is not important what the calorific standard is. What is of importance is that the calorific value should not change from day to day—that it should not be low one day and high the next. The reason for this is that incandescent burners and stoves are so made as to have a very nice adjustment of air and gas; and if the gas is richer and poorer, in neither case does it do its full duty.

Lord GORELL: It would be advisable to eliminate the possibility of such a wide range as from 540 to 475 B.Th.U.?

Witness: I do not think that range would be a serious detriment, although the more uniformity the better.

In answer to Mr. FITZGERALD, witness expressed the opinion that the illuminating power test might be continued for usefulness in future years without penalty. As to the object in having a value for the calorific test and a penalty when the gas was below a certain lower value, he agreed that there was really little object in a Bill of this sort in saying that the standard should be 540, and that no penalty was to be incurred until the gas fell below 475. It seemed to him a reasonable way of dealing with it to fix one standard and to say that below that penalties should be incurred. At the same time the same result was arrived at in both cases.

Mr. FITZGERALD put it to Professor Boys that under the Gas-Works Clauses Act there is no margin in respect of candle power.

Witness said that the whole question of multiple standards had arisen from the old days when candles were used for testing gas, and the candles and their wicks were so uncertain that no one test of illuminating power had any particular value. It was for this reason that three tests were required for the gas; and even so it was to a certain extent uncertain.

The CHAIRMAN: If you have a standard without a margin, in fairness to the Company you would have to have the standard very low, and the advantage of having a margin also comes in?

Witness: I do not think it makes the slightest difference ultimately which is done. Whether you say 550 and 500, or whether you fix the one limit at 500 and say that below this penalties shall be incurred.

In answer to Mr. PITMAN, on behalf of the promoters, witness said that if the illuminating test were continued without penalty it would not be necessary to have all the elaborate apparatus now required to be maintained, nor would it be requisite to have a large number of testing-stations in different parts of the supply area. It would be necessary at the one testing-station to retain the photometer table and things generally as they are; but the argand test, which had no practical relation to any use of gas at the present time, would not be necessary. A simple test on a flat-flame would be sufficient.

Mr. H. E. JONES, a Director of the Commercial Gas Company, and Chairman of the Wandsworth Gas Company.

Witness said he was one of those who were responsible for the Wandsworth Company's Act of 1912, in which the penalty for illuminating power was abandoned, and the calorific test imposed. Among the authorities who assented was the London County Council. Shortly after that the South Suburban Gas Bill was promoted; and the London County Council submitted that similar testing conditions as in the Wandsworth case should apply to the South Suburban Company. They were rather different terms, and perhaps a little more liberal than Wandsworth. He confirmed the previous evidence as to the lack of necessity for both the illuminating power test and the calorific power test, and said he failed to see anything in the present Bill by which the consumer would be damnified in any way. The Company had shown conspicuously in the last few years their desire to reduce the price of gas, and had in fact reduced it to the point of hardship to the Company. The dropping of the illuminating power standard in the Wandsworth case had not led to a single complaint.

Cross-examined by Mr. J. D. FITZGERALD, on behalf of the City Corporation, witness said that the illuminating power was still tested by the Wandsworth Company, but without penalties; the Company being under obligation to find the apparatus. The figures of thermal value applied to the Wandsworth Company were 538 B.Th.U. maximum, and 484 as the penalty figure. The average for 1913 was 532.

Mr. CHARLES HUNT, Chairman, South Suburban Gas Company.

Witness referred to the passing of the South Suburban Company's Act in 1912, already mentioned by the previous witness, and added that, when the calorific test was imposed upon that Company, the illuminating test was discontinued altogether as regards the districts to which the calorific test applied. It was discontinued even for information purposes. The calorific figures were 540, and 475 penalty. It was his opinion that this standard would be found to be a suitable one for the Gas Light and Coke Company, because the uses of gas in the two districts were identical. He could not trace a single complaint to the calorific test; and as to the suggestion that the absence of an illuminating standard would enable the Company to supply a non-luminous gas, he did not think this at all practicable. There must be a certain amount of illuminating matter in order to maintain a certain calorific standard.

Mr. FORBES LANKESTER cross examined at considerable length on behalf of the City of London Corporation. He first ascertained that the South Suburban Company were supplying under an illuminating test in some districts and a calorific test in others; and although the same gas was supplied throughout the area, the Company had complied with both forms of testing. On the average, the calorific value had been little below the standard of 540, but very considerably above the minimum of 475. There was a three days' testing in the Act, which he regarded as very desirable. Council, however, suggested that it was very undesirable, for the reason that on the day before the official testing the standard might be quite good, on the official testing it might be quite poor, and on the third day the Company would have the opportunity of bringing it up to the proper standard again.

In answer to the CHAIRMAN, witness admitted that a three days test did leave open the possibility of the gas being improved in the course of the third day for the purpose of the test.

Mr. PITMAN interjected with the remark that, under section 40 of the Gas Light and Coke Company's Act of 1909, as the three days tests were to be the day in question, the preceding day, and the day afterwards, anything of the kind suggested by Mr. Lankester was impossible. The tests were made every day, although the gas examiner only came occasionally.

Mr. LANKESTER, however, did not agree with this view, as on the first day he said no question would arise, and on the next day, when the Company's attention was called to it, they would only have to get the gas ready for the third day.

The CHAIRMAN: The question is: Can the Company, in the course of twenty-four hours, improve their gas sufficiently to make up for the deficiency?

Mr. PITMAN: It might be possible under the South Suburban Act for something of the kind to be done, because they have two days in which to do it. But what I am putting to this witness is whether, with the existing conditions, the Gas Light and Coke Company could possibly take such steps as are suggested.

Witness said he did not think it was possible.

This closed the case for the promoters.

The Case for the Opposition.

Evidence was then called on behalf of the London County Council.

Mr. JAMES OLLIS, Chief Officer of the Public Control Department of the County Council.

Witness said the Council had two principal grounds for objecting to the proposals in the Bill; one being that the time is not ripe for the suggested change, and the other that both the calorific standard specified in the Company's Act of 1909 and the calorific standard proposed in the present Bill were by themselves too low to safeguard properly the interests of the consumer. An examination of the records made by the official gas testers showed that the calorific standard had been preserved by the continuance of the illuminating test. The Council were very strongly of the opinion that uniform conditions should apply to the three principal Companies in London; and for this reason it was felt that the illuminating test should be maintained. In 1904, Mr. Carpenter, the Chairman of the South Metropolitan Gas Company, expressed certain views about the flat-flame burner. The Council felt it their duty to try and keep in touch with current opinion in the gas industry; and with this object the various journals in which the opinions of experts appeared were carefully studied. In the "JOURNAL OF GAS LIGHTING" for Jan. 24, 1914, there was an expression of opinion by Mr. Carpenter, which he (witness) would not have referred to now without having obtained Mr. Carpenter's authority to do so. This he had obtained.

Mr. PITMAN, on behalf of the promoters, objected to a reference to Mr. Carpenter's views, and suggested that Mr. Carpenter should be called.

The CHAIRMAN: I do not think we can accept that as evidence from this witness.

Witness, continuing, said that the returns of the official gas tests did not show any justification for the Company's statement that the dual test was irksome. They really showed that the interests of the consumers with regard to calorific power were actually safeguarded by the testing for illuminating power. The Council had drawn the conclusion from the Bill that the passing of it in its present form would enable the Company to supply gas of an inferior heating quality to that which the Company were now required to supply, and that, in consequence, the consumer would have to pay more in order to get the same amount of

heat. Whatever the intentions and the wishes of the Company might be at the present time, if the test for illuminating power was abandoned, the Company would inevitably work down to the point at which penalties arose. By working down to 475 B.Th.U. it was clear that a larger quantity of gas would be obtainable from each ton of coal if the test for calorific value only had to be satisfied. This was evident from the fact that, with the abolition of the test for illuminating power in 1912, the quantity of gas obtained by the South Suburban Company from each ton of coal had increased from 11,808 cubic feet in the June half year of 1912, to 12,710 cubic feet in the June half year of 1913; the amount obtained at the principal works of the Company having reached the high average of 13,060 cubic feet per ton of coal carbonized. Similarly, when the testing conditions of the Gas Light and Coke Company were relaxed during the period of the coal strike in 1912, the production per ton of coal increased from 11,906 cubic feet for the June half year of 1911, to 12,600 cubic feet in the June half of 1912. It was therefore difficult to resist the conclusion that the increase in both cases was due to the relaxation of the test conditions. The opinion of the Council was that any amendment should follow the lines of the Statute with regard to illuminating power; the figures being translated as near as possible from candles into heat units. Whenever the illuminating power of the Company's gas was 14 candles, the British thermal units were near 537. The penalties which should be imposed were, in his opinion, 40s. for a deficiency of (say) 18 B.Th.U. below 540, and if the deficiency was more than 18, but not exceeding 36, and for every subsequent complete 36 units, not less than £25 nor more than £100.

The CHAIRMAN: I think this hardly affects the matter.

Mr. PITMAN, for the promoters: I do not think that it is raised in the Council's petition, and it certainly was not suggested in the cross-examination.

Witness, in conclusion, urged, on behalf of the Council, that there should not be a wide margin allowed in the calorific test, having regard to the comparative uniformity of the figures obtained by the Company during the past four years.

In cross-examination by Mr. PITMAN, witness stated that he had no technical knowledge whatever of these matters himself, but had been merely putting forward figures and facts provided for him by the Council's staff. Questioned as to why the Council were now asking for figures different from those to which they agreed in 1912 for the South Suburban Bill, witness suggested that there was a considerable difference in the nature of the areas of the two Companies. As, however, he was obviously not able to deal with the point, Counsel did not press it. The County Council, added witness, were clearly of the opinion that there should be a calorific power test, but were equally of opinion that the test for illuminating power should remain. He could not point to anything in the past history of the Company which suggested that it would work down to 475 B.Th.U. He could not go beyond inference. If there was a point at which the Company became liable to a penalty, that was undoubtedly the point which the Company would have most in mind, and not an ideal standard. In saying this, however, he did not intend it as a reflection upon the character of the Company. He was merely looking at it from the commercial point of view.

The CHAIRMAN: Are you suggesting that the present minimum under the Act of 1909 is too low?

Witness: Certainly.

You think that 490 B.Th.U. is too low as a minimum?—Yes. The Council considers, having regard to all things, that the point to be established in any amendment of the Statute is to preserve the present character of the gas supplied by the Company. If the standard for illuminating power is removed and you get a standard for calorific power which is not the equivalent of the present standard for illuminating power, the Council feels that there will be a tendency for the quality of the gas to drop, and we shall get away from the conditions that prevail in London at the present time.

The CHAIRMAN: I understand you are protecting the consumer.

Witness: That is all.

Mr. J. G. NEWBIGGING, Chief Engineer to the Manchester Corporation Gas Department.

Witness said that, although there was a movement in the gas industry in favour of the calorific power test, there was by no means unanimity on the matter. In the present session of Parliament 17 Gas Bills were being promoted in which the illuminating power test was being asked, 16 in which the calorific power test was asked, and one in which both tests were asked. Calorific power tests varied to some little extent. The margin of 12 per cent. proposed in the present Bill was far too much for the Company's requirements, and he believed it would help to completely wipe out the flat-flame burner. He was very strongly of the opinion that provisions for testing town gas should be such as to maintain both the illuminating and heating power to a certain minimum; but he did not care whether this result was obtained by a single test or a dual test. He would prefer the average of two tests on one day to be taken for the purposes of penalty; and he regarded it as perfectly fair that the Company should have the figure of 540 imposed upon them. With their present system of carbonizing they could keep within 5 per cent. of this figure; and if they would adopt improved systems of carbonizing—continuous carbonizing in vertical retorts—they could keep well within 2 or 3 per cent. So that with a margin of 5 per cent. on 540 the Company would be perfectly safe. He agreed with the previous witness that the tendency of the Company would be to work to the lowest margin they might be allowed. This, in the case of 475 B.Th.U., would be a great hardship upon the flat-flame burner users, as they would have to consume more gas to get the same results as were obtained now. In his opinion the movement in favour of the calorific power test was an indirect way of securing a reduction in quality. He saw a very practical evil and a very great increase in cost to the unfortunate consumer as the consequence of the proposals in the Bill, while at the same time no corresponding advantage was to be given to the public.

Mr. PITMAN cross-examined on behalf of the Gas Light and Coke Company as to tests of thermal value at the Gaythorn Gas-Works of the Manchester Corporation on April 17 of this year. The average, said learned Counsel, was 519 B.Th.U. gross and 468 net, and in consequence the figure of 540 suggested by witness as being applicable to the London Company was not, in fact, worked to in his own department. Witness, however, repudiated the figures, and said that though it was possible that on one day it might fall below 540, he recovered as quickly as possible. He would get the exact figures and give them later.

Witness next had his attention drawn to evidence which he gave in 1910 on the Gas Companies' Standard Burner Bill, in which he stated that: "We do not attach any importance to luminosity of gas now; we take the calorific value." In answer to further questions, he said that he was not against the abolition of the illuminating power test so long as the calorific standard could be made to cover all classes of consumer. In reply to this, Counsel pointed out that the South Suburban Company still had a large number of flat-flame burner users; but no complaints had been made, in spite of the fact that the illuminating test had been abolished altogether. Witness suggested that in this case the Company were taking a course which would wipe out the 5 per cent. of consumers who it was alleged used flat-flame burners, because the evidence seemed to be that no importance was attached to these.

Mr. PITMAN: I think you must have misunderstood the evidence that has been given.

Witness, continuing under cross-examination, said that under the Bill the Company might strip the gas and supply non-luminous gas, and yet keep it at the same calorific standard. The illuminants could be stripped from the gas in suitable washing plant by heavy creosote. All the illuminants could be taken out, and a 475 B.Th.U. calorific value retained. This he could not agree would ruin the calorific value. He had tried it on a large enough scale to be dealt with commercially, although the actual work had been done experimentally. The possibility of its being done had been discussed among technical men, and had not been rejected, although it had not been accepted. As a matter of fact, it had not been known sufficiently long to be accepted yet. He believed the Gas Light and Coke Company themselves had been carrying out experiments during the last few months in this direction. It had been found in Manchester to be a perfectly commercial success to extract the benzol while the price of it was at a high figure, which was then 5s. per gallon.

Re-examined by Mr. FREEMAN, witness said that the great object he had in his evidence was to impress upon the Committee the necessity for having such a standard as would ensure heat and light sufficient for all classes of consumers.

This closed the evidence for the London County Council.

Thursday, April 30.

Mr. *Newbigging* was recalled with regard to figures of gas tests put to him on Wednesday by Mr. Pitman. Counsel had stated that the average of certain tests was 519 B.Th.U.; but the accuracy of these figures was disputed. Mr. Newbigging now explained that there are four gas-works in Manchester with a chemist at each, "who acts as a sort of policeman" between the Gas Committee and the Manager. These chemists are instructed to report the fair average quality of the gas day by day; and on April 17 this year the figure was 534, as against 519 suggested by Mr. Pitman. The lowest figure from Jan. 1 to April 28 was 533 1, and the highest figure 574. These tests were made at the Gaythorn Gas-Works; and it was emphasized that the chemist there is not under the control of the Gas Manager at all.

The CHAIRMAN said he did not think this difference between the promoters and the Manchester Corporation had any effect on the Committee on the main question.

Speeches of Counsel on Behalf of the Opposition.

Mr. FREEMAN then addressed the Committee on behalf of the London County Council. He said that as the result of the discussion which had taken place before the Committee, the points at issue had now come down to really very few in number, and that, in consequence, he would not have to make a long speech; but he hoped the Committee would not judge the importance to be attached to the matter by the length of his speech. The point of view of the City Corporation was that no case had been made out for the Bill. At present the Gas Company were working under what he preferred to call a bargain, or a compromise, between themselves and the London County Council, by which both an illuminating test and a calorific value test were imposed upon the Company. Such an arrangement having been come to, it ought not to be torn up at the instigation of one party unless some grave public inconvenience, or some very grave personal inconvenience to the Company, could be shown by reason of the arrangement having been carried out. Practically, however, no such case had been made out by the promoters. It was true that the arrangement made in 1909 was not intended to be permanent, and it was with that object that the provision was inserted whereby if either party desired to alter it they could apply to a purely scientific tribunal, such as would be set up by the Board of Trade, under the provisions of section 42 of the Act. Therefore it was a matter of some grievance to the London County Council that the Company had entirely departed from the machinery that they themselves had agreed to, and had asked the Committee to deal with the matter, because—if he might say so with respect—this being a complicated and scientific matter imposed a very onerous task upon the Committee. Another preliminary objection to the Bill was that it was an extreme inconvenience that London should be supplied by three Companies, two of whom retained the illuminating standard, while in respect of the other one this standard was to be abolished altogether. There was, he agreed, a growing feeling among the scientific witnesses that the calorific test was a good and sufficient test. If this was so, then he submitted that the proper way to deal with the matter was for all three Companies to have introduced a Bill which would have brought uniformity into the administration of the Metropolis, which was the very thing the London County Council had for years been labouring for, and which up to quite recently had not been obtained. It was perfectly obvious, however, that as neither of the other Companies had promoted a Bill they did not desire the change. What ground had been made out by the witnesses for the change? It had been stated by Sir Corbet Woodall that it was an inconvenience. What was the inconvenience? It was proved there was absolutely none, for, so far as the calorific test was concerned, the Company had not had the

slightest difficulty in keeping up to their full standard of 540. He maintained that the lighting test had necessitated the keeping up of the thermal tests as a consequence; but it did not follow that the calorific test would keep up the lighting test, and that had been admitted by the witnesses. Why should the flat-flame burner users be put in a position of being compelled to use a gas which would not give any light at all, or else of going to the expense of buying incandescent mantles, because the Company did not propose to supply mantles free of charge for every flat-flame consumer? While contending, on behalf of the London County Council, that the illuminating test should be maintained, he could not hide from himself the fact that a considerable amount of evidence had been given in favour of the calorific standard. But if the Committee were going to substitute the calorific standard and allow this to be the only standard, then it was a matter of the utmost importance that the Committee should make sure that any standard so imposed would result in the production of a candle power which would be sufficient. All the evidence showed that 540 would be a fair standard. Yet the Company was asking for a lower figure than this in the Bill, in spite of the fact that it was proved that during the severest time the Company had ever passed through—viz., during the coal strike of 1912—there had never been the slightest difficulty in keeping up to the top limit of the present standard, 540. Therefore he asked the Committee to treat the figure of 540 as the starting point. As a matter of fact, Sir Corbet Woodall said that he could work to a limit of 500 with a margin of 5 per cent., but if the Company, as had been shown, had no difficulty whatever in keeping up to 540, there was no necessity to cut the figure down to 500, and certainly not to allow the lower limit of 475, at which point the gas would be absolutely useless for lighting purposes. The London County Council were not merely justified in making this request, but felt they were compelled to do so in the interests of the public, because after all the proposal of the Company was primarily in the interests of the shareholders. No suggestion was made under the Bill that the public should have any advantages in return for the benefits the Company expected to obtain. For instance, it was not suggested that the standard price should be altered, and it could not be overlooked that the whole of the Bill was in favour of the Company.

Counsel then addressed the Committee briefly on behalf of the West Ham Corporation, and complained that in coming to Parliament with this Bill the Company were committing a breach of the arrangement under which the amalgamation of the Gas Light and Coke Company with the West Ham Company was agreed to in 1909. On the other points he took up the same attitude on behalf of West Ham that he had done for the London County Council.

Mr. TINDAL ATKINSON, on behalf the Ilford Urban District Council, addressed the Committee without calling evidence. He explained that in 1911 the Gas Light and Coke Company took over the undertaking of the Barking Gas Company, who supplied two-thirds of Ilford; the remaining one-third being supplied by the Ilford Company. Under the Act of 1911, however, there was no provision as to a calorific test, and the Council had been quite satisfied to remain under the illuminating power test. The reason for this was that there were still a large number of users of flat-flame burners; and it was admitted by the scientific evidence that under the calorific test it was possible for the candle power of the gas to be so reduced as to be practically useless. The Company, on the other hand, stated that they would supply suitable burners; but it was not suggested that they would replace every burner free of charge. He therefore asked the Committee to maintain the illuminating power test, with penalties.

The CHAIRMAN called upon the next opponent. It so happened, however, that none of the Counsel were present. A gentleman concerned in the Willesden opposition said it was desired to call a witness; but in the absence of Counsel he could not do so. He asked if the Chairman could give him a few minutes.

The CHAIRMAN: We cannot wait. I will call upon Mr. Balfour Browne to reply.

Mr. BALFOUR BEOWNE had hardly risen to his feet when Mr. FORBES LANKESTER, representing the City of London Corporation, entered the room and took his seat, apparently unaware of what had happened. Being informed that Mr. Balfour Browne was replying, he immediately appealed to the Committee.

The CHAIRMAN: No City of London Counsel was here, and I am not going to keep the Committee waiting. I do not know whether you can make any excuse.

Mr. FORBES LANKESTER said it had been arranged among the parties that the City of London opposition should come last. There were still two other petitioners before him; and knowing this he went to another Committee Room. He came back to find no Counsel present.

The CHAIRMAN: That may be an excuse for you personally; but it is no reason for the Committee to wait until Counsel have arrived.

Mr. FORBES LANKESTER: I quite agree. But I should like to ask your Lordship's indulgence that you will not preclude us from giving evidence in these circumstances. I desire to call an expert, who, I think, can help your Lordship materially.

The CHAIRMAN: In the circumstances, I think I must hear you.

Mr. FORBES LANKESTER, having received permission from the Chairman, called

Professor VIVIAN B. LEWES, Superintending Gas Examiner to the City of London.

Witness said that the calorific power of gas was becoming of greater and greater importance. Calorific power now meant everything, and illuminating power nothing. He had been preaching this for the last fifteen years; and in 1903 had foretold exactly what was now happening. There was still a small leaven of flat-flame consumers left, and they ought, to a small extent (commensurate with their interests) to consider them. It was, however, excessively difficult to find out what the percentage of flat-flame consumers really was. A census gave a totally false idea on the subject. In his own office, for instance, he had four incandescent burners and six flat-flame burners. These latter, however, were in positions where they were probably not lighted once in two years. A census of the City of London would probably show 20 per cent. of the burners as flat-flames; but they would mostly be in positions similar to those in his own office, where they were practically never used. In the Chief Committee room of the Guildhall at the present time there were four flat-flame burners; but they were never lighted. So that burners, *quâ* burners, were no indication whatever of the number of flat-flame consumers. He was inclined to agree that the amount of gas consumed by them was about 5 per cent. of the quantity sent out. As a penal test, he did not much value the illuminating test—indeed, he regarded it as an absurdity. But as the apparatus was installed at the testing-stations, and the gas examiners were doing their work, it would be well to continue the illuminating test for information, and also to enable the examiners to deal with the storm of letters which usually followed any change of this sort. This information would enable one to see how far these letters were justified and how far they were not. If precautions were taken to provide for an effective calorific test, a gas would be obtained which would also give the proper illuminating power. With a gas having a value of, say, 500 B.Th.U., the consumer would get about the same illuminating power as at present; but if the value were allowed to drop below 500, then the gas would be very nearly deficient in illuminating power. To a certain limited extent, calorific value and illuminating value went hand in hand. The point he wanted to make, however, as the Chief Superintendent of Gas Examiners in the City of London, was that he was strongly of the opinion that a calorific standard should be fixed which would be an absolute calorific value without any margin at all; and the one fixed should be that which it was perfectly well known a gas undertaking could maintain without trouble. No margin of safety was necessary; and he was perfectly agreeable to be liberal in the standard to be fixed below which the undertaking was to be penalized. It was, however, making a pure farce of gas testing to have a calorific value to talk about and another to penalize on. If, for some reason, a margin of safety was to be allowed—which he did not think was in the least required—then the margin should be above the absolute standard which he suggested. This latter standard should be between 500 and 540 B.Th.U., and the only condition attaching to it should be that, if the gas examiner obtained a test below the standard, he should give notice of it to the Company and test again within an hour. This was necessary, because it might be that the gas examiner had not very carefully tested his calorimeter, and something might have happened to the instrument which gave a low test. A second test, therefore, was only fair to the Company. Dealing with the suggestion that gas undertakings might find it profitable to produce gas with no illuminating power at all, witness said this was a pretty proposition on the face of it. Looking at the Gas Companies' returns, it would be seen that, with good gas coal, 12,000 cubic feet of gas per ton could be made; and it was stated in certain text-books that 2½ gallons of benzol could be obtained per 1000 cubic feet of gas by scrubbing. When one set to work with a pencil, it was calculated that the 2½ gallons of benzol represented 100 cubic feet of benzol; and as the original value of the coal was about 580 B.Th.U., the extraction of the benzol reduced this to about 540. From this point of view it looked a very promising proposition. But if one turned to the luminosity side of the question, it would be found that the taking out of the 2½ gallons of benzol brought down the candle power (say) from 14 to 6, which, in a flat-flame burner, was practically non-luminous. There it might be said was the necessity for legislation to stop this being done. The point on which the theoretical argument broke down, however, was that, in order to get this benzol out, the gas had to be scrubbed with the greatest possible care, and it had to be cooled down to a very low temperature. The result was that, with the selling price of benzol at 10d. per gallon, the gas manager would not find it a paying proposition, for it was to be remembered that, in order to get this 2½ gallons of benzol, the gas could not be made at more than 10,000 cubic feet per ton of coal, which absolutely closed the argument as regards modern gas making. As far as precedent went, on the other hand, benzol was selling at a very different figure from what it was now. Benzol was then 15s. per gallon—these were the piping times of the gas industry—and inasmuch as it did not pay to scrub the benzol out of the gas with the price at 15s. per gallon, he did not think there was much risk of the Gas Company treating it now. Sir Corbet Woodall had said that there was no intention of interfering with the illuminating power; and anybody who knew Sir Corbet knew that this was as good as an Act of Parliament. What he felt was, however, that, supposing a standard of 475 B.Th.U. was allowed, what some of the companies would do would be to utilize their carburetted water-gas plants—which were at present in many cases standing idle owing to the high price of oil—and make more water gas. Carburetted water gas had been used by the Gas Light and Coke Company to the extent of about 25 per cent.; and with this percentage there was about 12 per cent. of carbon monoxide present in the gas. The safety limit in the percentage of carbon monoxide was 16 per cent.; and if 475 B.Th.U. were allowed as the penalty standard, many companies might work to this, instead of the theoretical ideal of 540. What he feared most, however, was that some companies would use not carburetted water gas, but blue water gas, without getting below the calorific standard. If they took a straight coal gas of 580 B Th.U. and mixed with it one-third of blue water gas, giving a thermal value of 310, this mixture would be 490; and it would contain 17 per cent. of carbon monoxide, which would be beyond the safety limit. This was what he desired to avoid by putting the standard above that.

The CHAIRMAN: Are you suggesting 500 as an actual figure?

Witness: I have not suggested any figure; but 500 would prevent the use of this mixture.

Mr. BALFOUR BROWNE cross-examined to the effect that a fixed standard would practically tie the gas companies to one kind of coal, and prevent them from bargaining with the colliery owners. Witness agreed that this might be so; and for this reason he would be willing to be liberal in the standard fixed. Incidentally, he mentioned that if gas companies got into the habit of producing gas with 16 per cent. of carbon monoxide, he would strongly urge Parliament to legislate against it. Counsel referred to the evidence given by witness before the Departmental Committee in 1904, all of which he said he agreed with, and the effect of which was that 500 B.Th.U. would be about the right figure. Witness, however, added that 600 B.Th.U. could be obtained with a gas coal. During the course of this cross-examination, witness urged upon the Committee the necessity of doing everything

possible to enable the gas undertaking to encourage the use of gas-fires in order to diminish the smoke evil. He joined issue with Professor Vernon Boys in agreeing to a margin of calorific value below which the Gas Company would be penalized, and emphasized the point that there should be a fixed standard.

In answer to the CHAIRMAN, witness stated that if he were a gas manager he would never dream of stripping the gas of benzol.

In the course of further cross-examination witness agreed that there was great difficulty in getting uniform results with the illuminating test, and mentioned that, though he was acquainted with a good many gas examiners, he only knew one who could repeat absolutely his tests; and that man had one eye. On the question of the flat-flame burner, he said that if a man had such an affection for it that he would pay for 20 feet of gas in order to get the same light as he could get from 2 feet of gas in a mantle, he was not likely to ask the Gas Company to replace his burners. It appeared to be a matter of family affection.

CONCLUDING SPEECHES OF OPPOSING COUNSEL.

Mr. FORBES LANKESTER addressing the Committee, on behalf of the City of London Corporation, said he followed the advice of their technical advisers absolutely. On the other hand, some of the opponents seemed to desire that the illuminating test with penalties should be maintained, and from a consideration of the evidence on behalf of the Company, he could not see that any great harm or inconvenience to them would be done, because hitherto the Gas Light and Coke Company, working under the conditions of having the illuminating test in one part of their district and the calorific test in another, had found no difficulty in keeping up to either standard. His main point, however, was that the most important test was the calorific test, and that the standard fixed should be between 500 and 540. He asked, however, most emphatically, that the Committee should not agree to the suggested three days' test, but impose the condition that the whole of the test should be carried out on the same day.

Mr. COURTHOPE MUNROE, for the Leyton Urban District Council, said he was in exactly the same position as West Ham, and based his case in the interests of the users of flat-flame burners. If the Committee decided that the illuminating test must go, then he would ask that the Company should not be allowed to go below 520 in the calorific test.

Mr. ROWLAND BERKELEY, for the Willesden Urban District Council, said he desired to call a witness, but on the suggestion of the Chairman decided not to do so, as Mr. Herring (his witness) told him he was more or less in agreement with the other witnesses for the opposition. Counsel therefore addressed the Committee, and asked that the calorific standard should be taken as 540, below which the Company should not go without penalty. It had been shown over a series of years that anything up to and above 540 would produce a gas of 14 candles and upwards. This being the case, the Company ought not to be allowed to go down below 540 except to the extent of 5 per cent. variation to cover contingencies. This would give a minimum of 513. He further asked that, if the illuminating test was abolished for penalty purposes, it should be retained for information.

This concluded the case for the opponents.

The CHAIRMAN: I think it may shorten the proceedings, and shorten your task, Mr. Balfour Browne, when you come to address us, if I tell you that the Committee are of opinion that the illuminating test, so far at all events as penalties are concerned, is no longer necessary. So you may confine your remarks to the calorific standard and also to the question of the method of testing—that is to say, whether the test should be on one day, twice on one day, or the average of three days.

Concluding Speech of Counsel for the Bill.

Mr. BALFOUR BROWNE said that if he had known what Professor Lewes was going to say, he would have been the last person to object to his being heard. If, too, he had known that Mr. Herring was going to say, through the mouth of his learned friend, Mr. Berkeley, that there should be a 5 per cent. margin, he would have been glad to have had him in the witness chair, because these two gentlemen had proved his case. In regard to what Professor Lewes had said, his comment was that in the opinion of the expert advisers of the Gas Light and Coke Company it was wrong to make an absolute standard. Professor Lewes suggested that we could always work up to 500, but he had admitted that different results might follow from different varieties of coals. It might be that the Company could, in the ordinary way, with certain coal, work up to 500; but Newcastle coal, Midland coal, and other coal differed very materially, and what he wanted was a little margin to play upon. If the Committee fixed, for instance, the calorific standard at the absolute figure of 500, as Professor Lewes seemed to think it should be, they would be taking away the power the Company had got to-day, under which they could work down to 496 without penalties.

The CHAIRMAN: But you have told us pretty frequently that you never have worked down to it.

Mr. BALFOUR BROWNE said he believed that, except once during the period of the coal strike, this was so, and as a rule no doubt they could work at 500. He was told, however, that there was a difficulty in working; and apparently this was recognized by the other side, when Mr. Herring—who was a gas engineer of experience—told the Committee, through his learned friend, that he did not object to a 5 per cent. margin. He was content if he got a 500 standard with a possibility of 5 per cent. either way; and he would be quite willing to give up what Professor Lewes so much objected to—that was, the average of a three days' test. If he got what he believed was essential for the purpose of buying coal, and buying it in the cheapest market, with a margin of 5 per cent., he would be quite content to make two tests on the same day. This was not, as had been suggested by some of the opponents, a matter which had been finally settled to-day, because the section of the Act of 1909 which provided that the standard might be raised or lowered by the Board of Trade was being introduced by the present Bill with reference to the standard that would be fixed now. Therefore it was quite wrong to say that the decision of the Committee would be absolutely final. He really thought the whole matter was put before the Committee in the evidence of two experts—Professor Boys, on the one side, and Professor Lewes on the other. Uniformity, they both agreed, was important. What they differed upon was the question of margin. Professor Boys said quite distinctly that he did not think so wide a range as was proposed in the Bill would be a serious detriment; whereas, on the other side, Professor Lewes declared equally boldly that he would fix the standard absolutely. He was quite prepared, if the Committee thought it fair and reasonable, to take Professor Lewes' standard as given before the Departmental Committee—viz, 500—with such a margin as Professor Boys thought would be no serious detriment, and which would to some extent help in the purchase of coal. He would also remind the Committee that in the Board of Trade Memorandum there was a suggestion of a 5 per cent. margin, and he thought their Lordships would be doing right if they gave the Company this power. The Company were not going to attempt to outrage their customers. Their consumers were, to a large extent, in the same boat as themselves. What he was most anxious to do was to point out that every improvement that could be made by the Company, and every new invention that could be adopted with a view to cheapening the manufacture of gas, was not only in favour of the shareholders, but to a still greater extent in favour of the consumer, who received five-sixths of any reduction in the price of gas, as compared with the one-sixth that went to the shareholder. The whole anxiety of the Company was to supply at the lowest price a gas which would please the public best. As for the flat-flame burners, he really thought that Professor Lewes had disposed of them. If the people of Willesden and other places would persist in using flat-flame burners, they were wasting their gas, and getting an illuminating power quite inferior to what they could get with an incandescent burner. As for asking that there should be a 14-candle power gas as shown in the flat-flame burner, why, this had gone long ago. He would also like to point out that in the last few years the Company had reduced the price of gas to such an extent that the consumers in London had profited to the extent of £500,000 a year. In these circumstances, he thought the Company could be trusted. At the same time, he did not want too much trust. What he was claiming was that if the Committee should decide upon the 500 standard, and if they took away the three days' average test, they should give him a margin which apparently all the witnesses on the other side were also of opinion he was entitled to.

The Committee's Decision.

On the re assembling of the Committee after the luncheon interval,

The CHAIRMAN said: The Committee have given this matter careful consideration. We have already intimated that we do not propose to continue a test for illuminating value; but it seems advisable, in view of the evidence which has been before us, that a test for information purposes only should be maintained. The promoters claim that while the illuminating test should be done away with, the calorific standard should at the same time be lowered. We can see no good ground for this request. It appears to the Committee that, in consequence of the abolition of the illuminating standard, it would be more reasonable to raise than to lower the calorific standard. The real standard of the Company in the past has been its minimum. Although it has not been worked down to, one must regard that as the real standard. In this case it has been 496 B.Th.U. The only advantage of the maximum standard that is placed in the former Act appears to have been to have given some idea as to what the standard of gas produced should have been; and there may be some advantage in continuing to place in these Bills that idea. Consequently we propose to place only one figure in the Bill, and to allow from it a percentage which will cover any lapses—any margin of error there may be in the production of gas; and penalties will not be imposed until the Company run down below that percentage. Working upon the absolute minimum which the Committee think should be fixed, approximately of 500 B.Th.U., we arrived at the figure to put into the Bill of 540, less 7½ per cent. This brings the minimum down close to 500—namely, 499½. There is one other matter which has to be settled, that is the question of the period over which tests are to be taken. We consider that these should be taken all on the same day.

Mr. BALFOUR BROWNE: With regard to the illuminating test for information, that is to be a test, I suppose, with a flat-flame burner.

The CHAIRMAN: I understand the whole system of testing is by argand burners.

Mr. BALFOUR BROWNE: That is for penalties; but there is also a flat-flame test, which takes place once a week.

The CHAIRMAN: The object of the Committee is to see that the illuminating power in the flat-flame burner is kept up; and if this can be arrived at by a test in the flat-flame burner, that will be the decision of the Committee.

Mr. FITZGERALD, remarking that there were two tests now—the argand burner for penalty and the other for information—submitted that both ought to be retained for information purposes.

The CHAIRMAN: I do not think the Committee will want that. All they require is for information purposes only; and if a flat-flame test will give us the information, that is sufficient for our purpose.

Mr. FITZGERALD: It will give information with regard to the gas in the flat-flame burner; but it will not give information as to the general illuminating power of the gas.

The CHAIRMAN: The illuminating power in the flat-flame burner is the power which we want to safeguard.

None of the opponents to the Bill have taken any part in the adjustment of clauses, in order, of course, to preserve their right of opposition in the next house.

NORTH-EASTERN RAILWAY BILL.

Another Pipe Protection Clause.

The pipe protection clause in the Rhondda and Swansea Railway Bill, given on p. 274 of the "JOURNAL" for April 28, also appears in identical terms in the above Bill. It was an agreed clause, as in the Rhondda case.

LIVERPOOL UNITED GASLIGHT BILL.

HOUSE OF LORDS COMMITTEE.—Friday, May 1.

(*Before Lord* CLINTON, *Chairman*, *Earl* GORELL, *Lord* ERSKINE, *Lord* RAVENSWORTH, *and Lord* MONKSWELL.)

This Bill, promoted by the Liverpool United Gaslight Company, has for its objects to extend the limits of supply, to convert the capital, to sanction additional capital, to substitute a calorific for an illuminating test, and to relieve the Company from liability for sulphur impurities other than sulphuretted hydrogen.

Counsel for the promoters were Mr. HONORATUS LLOYD, K.C., Mr. VESEY KNOX, K.C., Mr. CLODE, K.C., and Mr. JACQUES ABADY. The opponents are the Liverpool Corporation, represented by Mr. BALFOUR BROWNE, K.C., Mr. G. J. TALBOT, K.C., and Mr. COURTHOPE MUNROE; the Bootle Urban District Council, by Mr. J. W. JEEVES; and the Lancashire County Council, by Mr. FORBES LANKESTER, K.C.

Mr. HONORATUS LLOYD, in opening the Bill, said he did not think the labours of the Committee would be quite as long as they might otherwise have been, having regard to the fact that one of the most important points in the Bill had been decided in the case of the Gas Light and Coke Company's Bill—viz., the calorific value test. Although the present Bill differed in some respects from that of the Gas Light and Coke Company in this matter as drafted, he would not trouble the Committee to go behind the decision in that case. He accepted the calorific standard laid down in the Gas Light and Coke Company's Bill, and also the provisions as to testing on one day. Liverpool occupied in the gas industry a very curious position. It was not like Liverpool. He hardly liked saying it; but in some senses it was a relic of the past. In the olden days the great object was to have high illuminating power; and a gas undertaking which had this could, in some respects, congratulate itself on being one of the leaders of the industry. All this had changed, however, as the Committee knew; but Liverpool, curiously enough, had been left in the lurch. As a matter of history, the present Company was the result of an amalgamation of two Companies in 1848. Under an Act of that year the illuminating power was fixed at 18-candle power by the batswing burner; but in 1865, the illuminating power was increased to 20 candles! Such a thing was unheard-of anywhere else; and, of course, it was a very costly thing to have to produce a gas which was unsuitable for the great bulk of the uses to which it was put. The Company obtained many subsequent Acts; and in 1895 an arrangement was made between the Company and the Corporation whereby the price to the latter should be less by 10 per cent. than that charged to private consumers. It was also provided in the agreement that, although tests should be taken of the Company's gas, no penalties were to be inflicted, but that the Company should take immediate steps to rectify any deficiency in candle power—the tests being made by a Corporation examiner with a portable photometer. The Lighting Committee also suggested that the candle power was too high; and the Directors of the Company then expressed willingness to consider any proposals that might be made by the Lighting Committee regarding this matter. In 1910, the question of the change of standard burner was before Parliament; the Liverpool Company being one of the 42 companies who promoted a Bill to change the testing burner to the "Metropolitan" argand No. 2. The Liverpool Corporation petitioned against it in the House of Commons, but were defeated in the Committee Room, as also were the Mersey Docks and Harbour Board. Objections were, however, raised in the House itself, with the result that the Company came to an agreement that the gas tested by the No. 2 burner should not give less than 18-candle power in the flat-flame burner. This was because the Corporation contended that gas giving 20-candle power in the No. 2 argand burner would give 5-candle power less in the flat-flame burner; whereas the Company said the difference would be only 2-candle power, and were prepared to back their opinion to the extent mentioned. There was also an arrangement as to price. As a matter of fact, however, this was now below the agreed price, being 2s. 1d.—lower than that charged by the Gas Light and Coke Company. The Corporation, in their petition against the present Bill, argued that this agreement constituted a bargain which was to stand for all time, and complained that the Company were departing from it in asking for a calorific standard of testing in lieu of the illuminating test. On the other hand, the Company contended that, as the agreement referred to did not deal with calorific testing, it could not have been intended that there should never be a calorific test in Liverpool. The two illuminating tests under which the Company now worked were absolutely unique. He did not believe there was now an undertaking in the country with anything like them. There had been other places with a similar experience, such as Glasgow and Edinburgh, where 20-candle power was the standard. Mr. W. R. Herring, one of the witnesses who was to have been called against the Gas Light and Coke Company's Bill, and who might be called against this Bill, used to be the Engineer at Edinburgh; and he could tell the Committee that in both Glasgow and Edinburgh they had been able to persuade Parliament to change the standard to 14-candle power. The whole tendency of parliamentary practice was to reduce the candle power; but Liverpool, with its 20-candle power standard, was on a pedestal which involved the Company in great expense. They had to buy cannel coal (which was very difficult to get, and consequently very expensive), oil, and other matters, all of which helped to keep up the price of gas. The Company desired to be able to supply the cheapest possible gas; and there was no question in this case that the consumer would get the benefit, because the Liverpool Company was a maximum price Company, and for many years had been paying the maximum dividend. It was true that last year this was not done, owing to the price having been brought down rather too low; and one of the things that the Bill would do would be to obviate an increase in the price. Generally, however, the Company could not benefit themselves, as there was no sliding-scale. With regard to the extended limits of supply, there were one or two small additions proposed, including Chilwall, where the Marquis of Salisbury owned a works supplied in bulk by the Company; but he desired the Company to take over the undertaking, and this was being done. There was no opposition from any of the local authorities concerned. The only objection, such as it was, came from the Liverpool Corporation. The conversion of capital clauses were in the usual form; the capital being converted into twice the nominal value at half the dividend rate. When the Bill was drafted, powers were asked for £1,000,000 additional share capital; but this was an error. The intention was to ask £1,000,000, including borrowing powers; and the alteration had been made in the clause. Dealing briefly with the calorific standard, Counsel pointed out that the inclusion of the Gas Light and Coke Company's amended clauses would have the effect of reducing the Liverpool Company's candle power to 14. He pointed this out in order that the Committee should know it, because if he were to be compelled to keep up the 20-candle power standard, the calorific standard would be in the neighbourhood of 600 B.Th.U.

The CHAIRMAN: It will be a matter for you to argue as to the number of flat-flame burners in use, because the decision we have given obviously cannot apply to every district and every place.

Mr. HONORATUS LLOYD said he believed he would be able to satisfy the Committee on this point—indeed, it would be shown that the percentage of flat-flame burners was less in the Liverpool area than in that of the Gas Light and Coke Company. The reduction in candle power was one of the most important things in the Bill from the Company's point of view; and the only reason he could advance for the Corporation opposing this step, which would lead to cheaper gas, was that they were the electric supply authority, and did not desire to see the commodity supplied by its competitor cheapened. Of course, it was the duty of the Corporation to push their trading department; and he did not know whether this was the reason for the opposition. It was not the Company's capital that kept the price of gas up, because the capital per million was the abnormally low figure of £423; while the annual charges were also extraordinarily low—being only 6d. per 1000 feet. All that could be found against the Company was that they were compelled to buy costly cannel coal to produce an article which nobody wanted. With regard to their request to be relieved from restrictions as to sulphur impurities, by the process of elimination Liverpool was again in an unique position, because he believed that the restrictions had been swept away from every gas company except Liverpool. An amusing point here was that the Corporation, who supplied gas in Fazakerley at a higher price than the Company did in their area, objected to the relief in question so far as the Company was concerned, and yet were not under the restrictions in their own area. As a matter of fact, the Corporation's gas undertaking was not one that could be spoken of in terms of praise, because he did not believe a single consumer in Fazakerley was satisfied with it. Perhaps the less said about the Corporation supply the better. But if anything more was heard about it, he would be able to show the Committee that the Company were in by far the better position of the two in every respect. Objection was also taken by the Corporation to the proposed increase of area, and the differential up to 6d. suggested for the added area. But even if the Company charged the full 6d., which it was not anticipated would be necessary, the price would still be below that charged in Fazakerley by the Corporation. Another objection to the additional area was that it would, so to speak, hem in the Corporation and prevent an extension of the municipal gas supply. The Bootle Corporation asked for both an illuminating test and a calorific value test, and generally raised the same points as did Liverpool. The suggestion was also made that the lower quality gas would affect the gas-engines running in the district; but he could assure the Committee that it was merely an adjustment of the control and valves in order to get the right mixture. Finally there was the petition of the Lancashire County Council, which was mainly on clauses. With regard to the one point of principle raised—viz., the laying of pipes for ancillary purposes—he could say that the Company did not propose to lay any in the area coming under the jurisdiction of the County Council.

At this stage, the Committee adjourned until yesterday (Monday).

ISLE OF THANET GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Monday, April 27.

(*Before Sir* HARRY SAMUEL, *Chairman*, *Mr.* FRANCE, *Mr.* ORDE ROWLETT, *and Mr.* ROBINSON.)

The proceedings on this Bill—the opening speech on which, by Mr. Honoratus Lloyd, appeared in the "JOURNAL" last week, p. 271—were resumed to-day, when evidence on behalf of the promoters was taken.

Counsel for the Bill were: Mr. HONORATUS LLOYD, K.C., Mr. LYNDER MACASSEY, K.C., and Mr. SZLUMPER. The opponents were the Margate Corporation, represented by Mr. BALFOUR BROWNE, K.C., and Mr. TYLDESLEY JONES, and the Broadstairs Urban District Council, represented by Mr. VESEY KNOX, K.C., and Mr. KEEN.

Mr. *W. A. Schultz*, chartered accountant, dealt with the existing capital powers of the Isle of Thanet and Broadstairs Companies, and also the basis of the exchange of shares between the two concerns, particulars of which were given in Counsel's opening speech. Emphasis was laid upon the point that, whereas the Broadstairs Company could, under the sliding-scale, pay dividends amounting to £6476 per annum, only £4939 was in fact paid last year. It was fully anticipated, however, that the full dividend would be paid for the current year if the Companies remained separate. Under the amalgamation, however, on the present price of gas, the shareholders could only receive £5946 In this way the Broadstairs Company were sacrificing some of their dividends; so that it could not be said that the amalgamation was unduly in favour of the Company. He thought the amalgamation was the very best thing that could have been proposed in the interest of everybody. Economies in the production of gas were bound to follow. Immediately, the Broadstairs Company were making some sacrifices; but it was to the future that the Company were looking for their reward, inasmuch as, under the amalgamation, the price of gas would be reduced to a greater extent, and more quickly than under present conditions, and increased dividends due to this would follow.

There would be savings in the management expenses amounting to £500 per annum.

Mr. BALFOUR BROWNE cross-examined for the Margate Corporation, first on the compensation to officers provided for under the Bill. The amounts to be paid to the Chairman and Vice-Chairman—£1000 and £600 respectively—witness considered reasonable, having regard to the remunerations of the Board in the past, which were £100 and £50 respectively. The Chairman of the Broadstairs Company was also Chairman of the Isle of Thanet Company, and would remain so. Why, therefore, said Counsel, should he receive compensation in the circumstances, especially remembering that the Chairman was 83 years old? With regard to the compensation of the Engineer, Manager, and Secretary, this was to be agreed or determined by Sir Corbet Woodall; and Counsel suggested that any figure might be fixed.

The CHAIRMAN asked if evidence would be given as to whether the services of these officers would be retained under the amalgamation.

Mr. MACASSEY, for the promoters, said evidence would be given on this point. As a matter of fact, the three offices referred to were actually held by one man.

In answer to further questions, witness said that the Engineer of the Broadstairs Company at present received £350 salary; and it would not be unreasonable to adopt a ten years' purchase as in the case of the Chairman—making a compensation allowance of £3500. The Engineer of the Thanet Company received £883 per annum. He was to continue as Manager of both works; and the probable increase of salary was £50 per annum. Mr. Balfour Browne suggested that he would probably want the £350 now being paid to the Broadstairs Engineer. It was also suggested that the Secretary of the Thanet Company would expect an increase of salary; and witness was pressed as to what the increased salaries would amount to after the amalgamation. He said no definite arrangements had been come to; but he anticipated that there would actually be a saving of £550 per annum on the two undertakings. He could not, however, give the details. The £3500 for the Engineer would be a capital charge. It was agreed, in answer to the Chairman, that interest on this must be deducted from any saving which it was contemplated would be made. Counsel expressed surprise that the sum should be made a capital charge, instead of being written off over a number of years. The payment of dividends by the Broadstairs Company free of tax was characterized by Mr. Balfour Browne as illegal. It had been so decided; and yet, he added, compensation to the shareholders was to be based on the present dividends *plus* income-tax. Witness agreed that this was so. Attention was next called to the low figure of repairs and maintenance for the past 24 years on the Broadstairs undertaking—viz., 4·88d. per 1000 cubic feet sold—as tending to increase the dividends of the Company. In 1913 the figure was 3·4d.; and the suggestion was made that this had been reduced in order to swell the profits of the Broadstairs Company for the purpose of the amalgamation. The question of obsolete capital of the Broadstairs Company was then raised; witness putting the figure at £10,000, and Counsel at £20,000. From this Counsel argued that, as the consumers in Margate represented three-fourths of the total in the two areas, this proportion of the obsolete capital, if it were to be paid off out of revenue, would have to be paid by Margate. Witness agreed with Counsel that, although the actual sales last year by the Broadstairs Company were 88 million cubic feet, at one time the Company believed they had sold 93 million cubic feet. It was he who discovered the mistake when he was called in at the end of March in connection with the Bill. He did not advise as to the terms of the exchange of shares. The capital expenditure per million at Broadstairs was £1157, and on the Margate undertaking £341. As to works, Counsel said those at Margate could go on for a considerable number of years with the addition only of one gasholder; but it was pointed out that the site at present was full. Another detail referred to was the absence of any provision for depreciation of stoves and meters last year—it being pointed out that this would have reduced the profit by some £600, had sufficient allowance been made.

Mr. VESEY KNOX, for the Broadstairs Urban District Council, cross-examined as to the benefits of the amalgamation to the two undertakings; and it was agreed that the only real saving to the two Companies would be that arising from the reduction of cost of manufacture and from the general reduction in expenses due to the larger concern. Therefore, said Counsel, there was to be increased difficulty put in the way of the local authorities purchasing the undertaking with only the benefits to the consumers mentioned above. Witness, however, did not agree that any very great difficulty would result. The question of purchase did not arise in the matter. The point was that Counsel argued that this transaction was a sale, and that the local authority should be given the first option of purchase. On the other hand, the promoters contended that it was not a purchase for cash, but merely an amalgamation by the exchange of shares. Counsel suggested that the present was the most opportune moment for the local authority to purchase. Witness, however, said the matter should only arise when the Company had shown themselves incapable of carrying on the undertaking. Counsel persisted that this was a sale for cash, inasmuch as the Isle of Thanet Company's shares were readily saleable in the gas market, and, indeed, were much sought after. As to the advantage to the Broadstairs consumer, it was pointed out that there had been no decrease in the price of gas for twenty years, but that the Broadstairs Company were just coming to the point when they would be encouraged to reduce the price, seeing that it was anticipated that this year the full dividend would be paid under the sliding-scale. Therefore, said Counsel, there was very little in the amalgamation from that point of view. Witness, however, preferred to believe that decrease in the price of gas would take place much more rapidly under the amalgamation than if the Companies remained separate. Against this Mr. Vesey Knox urged that with better management improved results could be obtained, and he drew attention to the fact that in 1911 no less than 29·11 per cent. of the gas was unaccounted for. Witness pointed out, however, that this was due to a leaky holder, which could not be put out of action in order to repair. In 1913 the percentage of unaccounted-for gas was only 7 per cent.—the result of the erection of a new gasholder station. Discussing the difference in price as between the two areas, Counsel suggested that it was not fair that the Broadstairs consumers, having in effect gone to the expense of the new works, should be saddled with a permanent differential of 6d. per 1000 cubic feet compared with Margate. Therefore he suggested that the local authority should have an opportunity of purchasing, rather than allow this differential to exist for all time. As the Margate consumer would get the benefit of the new Broadstairs works, the price in the two districts should be the same. Further, under the proposed clause dealing with the differential price, there was nothing to prevent the price being raised in Margate with a corresponding increase in Broadstairs. Witness thought that, taking all the circumstances into account, the proposed differential was not unfair. In any case, the difference between the Broadstairs price and that in Margate would be reduced very considerably from what it is now. On the question of compensation to Directors and officers, witness believed that ten years was general; but Counsel said that seven years was the usual period. He also said it was against the practice of Parliament to allow amalgamations where both local authorities opposed.

There was some discussion as to the meaning of the clause dealing with the differential, which the Chairman said he could not quite understand.

Mr. MACASSEY, for the Bill, said that, whatever the present wording of the clause, the intention was to reduce the price of gas in Broadstairs until the difference in price as between the two areas should be 6d. instead of, as at present, 10d.

In re-examination, witness said that his estimated saving of £500 per annum in working expenses was upon the basis that the Engineer of the Broadstairs Company would go, which was the understanding. He had not, however, taken into account the £175 interest at 5 per cent. on the £3500 compensation to the Engineer. Therefore on this account the estimated saving would be less by £175.

The CHAIRMAN, referring to the question of the payment of dividends free of tax, said he had looked up the original Acts of the Broadstairs Company, and there was no authorization to pay tax.

Mr. MACASSEY said he did not contend that if the tax had been paid it was legal; but it was one of the conditions of the debenture stock issue that no tax should be paid. At the same time the consumers had not suffered, because the ordinary dividends could have been made up—as they were below the standard—by the use of the money paid in tax on the debenture stock. It was entirely a domestic matter between the shareholders.

The CHAIRMAN: I agree.

Tuesday, April 28.

On the resumption of proceedings this morning,

Mr. *E. H. Stevenson* said that the amount for depreciation in fittings, meters, and stoves in the Thanet Company for the year 1913 should have been £547; but only £59 was shown in the Company's books, and there was a shortage of £515. Although this was a very good thing from the Company's point of view, it was really a capital expenditure taken out of revenue.

The CHAIRMAN asked witness whether it was considered good business to write off depreciation.

Witness said that it is largely customary now.

The CHAIRMAN insisted upon a reason being given as to why depreciation had not been written off in 1913, as had been done in other years; and it was decided to call a witness on this point at the conclusion of Mr. Stevenson's evidence.

Witness, continuing, said it was necessary and advantageous for the Isle of Thanet Company to enter into the amalgamation scheme set out in the Bill, for the reason that they had had very great difficulty in finding land upon which they could place either a new gasholder or new works in Margate. It was absolutely essential that the Company should obtain land at once for the erection of a new holder; and it would soon be necessary for them to put up new works to assist the present ones, which would mean a large capital expenditure. He did not think that either the consumers in Margate or Broadstairs would be in any way injured by the amalgamation—indeed, they would be greatly benefited. At the new works there would also be a saving per ton of coal carbonized. The Thanet Company obtained their coal cheaper than did the Broadstairs Company, owing to the fact that the former was a larger undertaking; while under the new conditions the cost of labour would be 2s. less per ton of coal carbonized than was the case at the old works, as the charging of the retorts, &c., would be done by machinery. With regard to the financial position, he did not think the present Broadstairs undertaking would be able to reduce the price of their gas for some years, assuming the proposed amalgamation did not take place. They had recently had a large amount of plant scrapped, and new plant installed; and the portion scrapped had to be paid for. Any savings or increase of profit which might accrue, therefore, had to be used for this purpose. Until the plant was paid for they could not reduce the price of gas; so that it was clear that Broadstairs must benefit by the amalgamation. The scheme would, however, enable the Thanet Company to sell their gas cheaper, owing to the larger quantity manufactured, consequent upon the amalgamated Company supplying in the two areas. The Bill as originally drawn up provided for an annual decrease of 1d. per 1000 cubic feet in the price of gas in Broadstairs, until the price there should not be more than 6d. per 1000 cubic feet above the Thanet Company's price. This clause, however, was altered. As it stood to-day it ensured a reduction of 1d. per 1000 feet per annum in the Broadstairs district until the difference between the two areas amounted to 6d. per 1000 feet, and then it should be left to the Company to reduce it further when they thought fit; but they should not be compelled to do so at present.

The CHAIRMAN remarked that he thought the scheme for price reduction in Broadstairs rather complicated.

Witness said that the sliding-scale did not take any effect in Broadstairs until there was a difference of only 6d. in the price in the two districts; but there was the annual reduction of 1d., and no increase of dividend.

The CHAIRMAN suggested that it could be arranged that this might never take place.

Witness, continuing, said that in the event of a coal strike, if the two Companies were separate, each one would have to put up its price; and, so far as past history went, Broadstairs would have to put up the

price before the Thanet Company. He had considered the question of further capital necessary for the Company in the event of amalgamation, and did not think that the £200,000 loan capital asked for was too much.

Mr. SZLUMPER, for the promoters, dealing with the petition of the Margate Corporation, said that it was feared the consumers in Margate would not be in such a good position as they were now. Witness did not, however, agree with this view. There was also an objection on the ground that unpleasantness would arise at the works from sulphate of ammonia; but he attached no importance to this.

Some discussion then took place as to why the word "sale" was used in the Bill, having regard to the fact that the scheme was not a sale, but a kind of partnership. Mr. Szlumper said that this was the word used in the agreement between the Companies. This did not, however, settle the matter; the Chairman raising the point as to why it was in the agreement.

Witness said that if the Broadstairs Company sold their undertaking to the Council, the latter would have to pay for it in money, and not by the transfer of shares, as was the case under the amalgamation scheme.

Mr. TYLDESLEY JONES, for the Margate Corporation, in cross-examination, expressed the opinion that the Thanet Company was a well-managed concern. Witness agreed that the coal used by the Company was sea-borne coal, and therefore it could be got cheaply. The Broadstairs Company had also used sea-borne coal; but they had only done this recently, and to a small extent. The retort power of the Thanet Company was 2 million cubic feet per day; and the maximum output in the summer, when the greatest quantity of gas was used, was nearly 1,600,000 cubic feet. The works were very congested. Apart from the want of gasholders, witness did not agree with Counsel that the works did not need to be extended. Referring to the difficulty of getting a site for additional works, there was trouble in storing coal and coke. Counsel thought there was plenty of room near the works for this purpose, as it could be stored anywhere; but the Margate Corporation had never been approached by the Company with regard to utilizing land for this purpose. Witness denied that if it was possible to extend the present works it would be economical to do so rather than separate them. Reverting to the Broadstairs Company, witness said that, although they had not reduced their price for many years, this was no reflection on the management. If the amalgamation was sanctioned, any extensions would take place at the new works of the Broadstairs Company; but the Margate works would still be maintained as the main works—for the present, at any rate. It was suggested that the new gasholder required by the Thanet Company should be put near the Broadstairs works, although the gas would have to be brought from Margate to Broadstairs (1½ miles), and then back again to Margate for distribution.

Mr. TYLDESLEY JONES said that the distance would be 1½ miles direct; but as the mains would have to be laid under the roads, the distance would be a little over two miles. There would therefore have to be an additional four miles of mains if the gasholder was erected in Broadstairs.

Mr. VESEY KNOX also cross-examined for Broadstairs. Witness admitted that the amalgamation scheme was entered into in order to secure the site for the Thanet Company near the Broadstairs Company's works; it being feared that the Broadstairs Council would oppose the Thanet Gas-Works being put in the Broadstairs area. Counsel, however, gave his assurance that the Broadstairs Council would not oppose the proposition, provided the amalgamation proposals were dropped, and suggested that, in the circumstances, an agreement might be come to between the parties.

The CHAIRMAN put questions to witness to show that the Margate Corporation did not object to the Thanet Company erecting new gas-works.

Mr. TYLDESLEY JONES said that, in point of fact, the Margate Corporation wanted the works in their district, and would give every facility for the Company obtaining a site there. The Company had only once approached the Corporation with regard to acquiring a site in the district; but it was refused because it was part of the site used for the water-works, and would interfere with that undertaking.

In reply to Mr. VESEY KNOX, witness said that the consumption in Broadstairs was 8000 cubic feet per person per annum, as against 11,000 cubic feet in Margate; this being due to the fact that there were more lodging houses and similar buildings in Margate. Counsel gave instances where large undertakings had acquired others, such as the recent case of the Brentford Gas Company taking over the undertakings in Staines and Sunbury, where it was provided that the price ultimately charged should be level throughout the whole area.

In answer to Mr. FRANCE (a member of the Committee), witness said that the present gasholder station in Broadstairs was in an unsuitable position, being right away from the population, and altogether in the wrong direction for a gasholder or works. The new one would be in a good position, because the works would be extended there in future.

Mr. *Lazarus Hart*, J.P., the Chairman of both the Isle of Thanet and the Broadstairs Companies, speaking with regard to the word "sale" being inserted in the Bill, said that he knew nothing of a sale, and there was no intention of it at all. He also answered the question raised by the Chairman earlier in the proceedings as to why depreciation on fittings, meters, and stoves was not written off in 1913. The reason was that a liberal allowance had been made for depreciation in previous years, and the Company had also expended about £30,000 on new works, which were unremunerative in 1913.

Mr. *E. C. Cooper* (Messrs. R. W. Cooper and Sons, Parliamentary Agents), on the question of the word "sale" being used in the Bill, said that the shareholders held shares in both Companies; and although it was really an amalgamation, the matter came to him first in the form of a purchase.

Wednesday, April 29.

When the Committee sat this morning,

Mr. MACASSEY, on behalf of the promoters, said he had taken the opportunity of considering the whole position with Mr. Honoratus Lloyd and his clients, and they had come to the conclusion that, although they were prepared to justify the amalgamation of the Broadstairs Company with the Thanet Company on its own basis as being in their view a proper proposal in the interests of the consumers, yet, having regard to the opposition which had been raised by both the Corporation of Margate and the Council of Broadstairs, it appeared now that one of the reasons which induced the promoters to come for the amalgamation was the acquisition of the site in Broadstairs. An agreement had now been come to that the Margate Corporation were to withdraw all opposition to the acquisition of the site in Broadstairs if the promoters were prepared to withdraw the amalgamation proposal; and the Broadstairs Council were also prepared, if the amalgamation proposals were withdrawn, to withdraw their opposition to the acquisition of the site. In the view of the Company, the acquisition of the site was the most material point. As both authorities would help the Company with regard to this particular site under these conditions, ensure proper access to it, and make it serviceable for the supply of gas to Margate, the Company were prepared to withdraw all their proposals for amalgamation. So that the position was that the Company would not press these proposals, but would proceed with the remainder of the Bill with regard to the acquisition of the site, and other incidental matters arising. Counsel therefore asked the Committee to give the parties a little time to consider the matter, and arrive at a settlement of outstanding matters.

Mr. TYLDESLEY JONES, for the Margate Corporation, said that their objection throughout had been to the amalgamation. If this was withdrawn, there were a large number of provisions in the Bill, including those referring to the Broadstairs site, to which they were prepared to give assent and support. The Company had supplied the borough well; and the Corporation were prepared to facilitate the carrying on of the undertaking to the greatest possible advantage.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents), in the absence of Counsel for the Broadstairs Council, said it must be understood that a reasonable area would be left round the existing works of the Broadstairs Company to enable that Company to extend in the future. It would be a convenience if the Committee allowed a little time to discuss the matter.

Mr. MACASSEY said he had been informed by Mr. Cooper, the Agent for the Bill, that it would involve a complete re-casting of the form of the Bill.

The Committee therefore adjourned until yesterday (Monday), when the remaining provisions of the Bill were dealt with.

LONGWOOD AND SLAITHWAITE GAS BILL.

HOUSE OF LORDS COMMITTEE.—Thursday, April 30.

(*Before Lord* CLINTON, *Chairman*, *Lord* GORELL, *Lord* RAVENSWORTH, *Lord* ERSKINE, and *Lord* MONKSWELL).

This Bill provides for the transfer of the Slaithwaite Gas Company's undertaking to the Longwood Gas Company, and confers further powers upon the latter Company.

Mr. RAM, K.C., and Mr. PITMAN appeared for the promoters; the only opponents, the Golcar Urban District Council, being represented by Mr. WEDDERBURN, K.C.

Mr. RAM, in opening, explained that the two Companies, who are supplying in contiguous areas, were both in the position of having to spend considerable sums of money in the erection or reconstruction of their gas-works in order to meet their increasing demands. In the case of the Longwood Company, a sum of £20,000 would have to be expended to deal with the existing area; while between £7000 and £8000 would have to be expended by the Slaithwaite Company in their area. It was felt, however, that the amalgamation of the two undertakings would lead to great economies, both in the necessary capital expenditure and also in the working expenses of the undertaking. At present the price of gas in Longwood was 2s. 6d. per 1000 feet, and in Slaithwaite 2s. 11d.; but it was proposed that after two years the price in Slaithwaite should be reduced by 1d., and after that by 1d. annually until the prices in the two areas were the same. It was the intention to close-down the Slaithwaite works if the amalgamation scheme were carried out, mainly for the reason that the Longwood works were in a much more advantageous position, and also on account of the economies accruing from the concentration of the works on one site. The only opposition to the scheme was from the Golcar Urban District Council, who asked that there should be a reduction in the standard price, and also that there should be one charge for gas over the combined areas immediately following the amalgamation. With regard to the first point, Counsel maintained that the capital of the gas undertaking was raised upon the security of the standard rate granted by Parliament, and that it would be unfair to shareholders to reduce this rate after the capital had been subscribed. There were very few cases in which this had been done, and then only when exceptional circumstances had been shown. Since 1912 the only case he knew of was Wakefield; and there the circumstances were wholly exceptional, because it was agreed by the promoters that the standard price had been fixed very many years before, and at a very high figure. It was acknowledged that a mistake had been made; and he hoped the Committee in this case would not alter the standard price, as no such exceptional circumstances could be shown. As to the uniform charge throughout the whole area, he submitted that it would be unfair to the Company, having in view the large capital expenditure which would have to be incurred after the amalgamation, to have to supply gas in the Slaithwaite area at the same price as it was now being supplied in Longwood. The differential offered, he contended, was a perfectly fair one. Another point raised in the petition of the Golcar Council was in regard to the proposed alteration in the testing burner to the "Metropolitan" argand No. 2. But as this involved no alteration in the standard candle power, he did not quite understand why the point had been raised.

Mr. *John H. Brearley*, the Engineer, Manager, and Secretary of the Longwood Gas Company, said that his Company were on the point of issuing £10,000 additional preference stock at 4 per cent. when the

negotiations for the amalgamation began. In 1875 the Company was incorporated as a maximum-price Company, with a maximum price of 5s.; but in 1902 the sliding-scale was introduced, with a standard price of 3s. 1d. Since then the price had been gradually reduced to 2s. 6d. Extensions and modernization of his Company's works were essential. There was no stand-by in the retort-house, and practically the whole of the manufacturing plant required renewal and adding to. If the amalgamation were carried out, the Company proposed to practically erect new works to supply the combined district.

Cross-examined by Mr. WEDDERBURN for the Golcar Urban District Council, witness said that the estimated expenditure on the new works under the amalgamation scheme was £35,000. Economies were anticipated by the installation of machine stoking and mechanical elevating plant instead of using labour, as at present. The labour problem was very acute, particularly in gas-works; and he would not be surprised if he was able to effect an economy of 2d. per 1000 cubic feet in this way. The shareholders in the combined Company, however, would not be in any better position until the obsolete capital due to the shutting-down of the Slaithwaite works had been written off. He confirmed his own Counsel's statement as to the differential, although he accepted the general principle with regard to the gas undertakings of one area one rate. This would eventually come into operation in 1921; and it was only fair that the Company should have a few years in which to deal with the obsolete capital before the rate was brought to the same figure in both areas.

Mr. WEDDERBURN, in reply to the CHAIRMAN, said his point was that as the Company were really starting afresh, there was no reason why the principle of one area one rate should not apply.

The CHAIRMAN: But you will not be injured by what is being done?

Mr. WEDDERBURN: We are being injured, because our power to purchase is prejudiced.

In re-examination, witness said that the Slaithwaite consumers would get larger reductions of price than could ever be possible if the Company remained separate.

Mr. *John Furness*, the Engineer, Manager, and Secretary of the Slaithwaite Company, also gave evidence in support of the amalgamation scheme, and confirmed the statement of the previous witness in this connection.

Mr. WEDDERBURN'S cross-examination was to the same effect.

The CHAIRMAN, on the question of one area one rate, asked if it was disputed that there were many gas areas in which there were differential rates.

Mr. WEDDERBURN agreed that there were, but said that the general principle was one area one rate, unless exceptional circumstances were shown.

Mr. *W. Crowther*, the Chairman of the Slaithwaite Company, and a Director of the Longwood Company, also gave evidence.

In cross-examination, witness said he foresaw some increase in the charge made in Slaithwaite unless the amalgamation took place.

Mr. *Henry Woodall*, who has advised the two Companies in regard to the amalgamation, said that both of them would have to build new works if they remained separate. Whereas at present one works would have to be reconstructed to supply 123 million cubic feet and the other 49 millions per annum, a much more economical alternative would be to have one works supplying 172 million cubic feet per annum, with one set of officials, and, consequently, only one set of management expenses. Very considerable savings would also be made by having machine charging in the retort-house. He did not know of any instance where, immediately after an amalgamation, the prices in the two areas had had to be reduced to the same figure. In the case of Bournemouth, there was a permanent difference of 4d.; and in Croydon and Caterham, a difference of 5d. It would be unfair to the Longwood shareholders now to reduce the standard price and the standard dividend after they had paid high premiums for their shares. The Wakefield case, as already mentioned, was one in which there were most exceptional circumstances.

Friday, May 1.

In cross-examination by Mr. WEDDERBURN, witness said his advice had been mainly concerned with the capital expenditure and the arrangements for the transfer of stock. He had not gone into the question of economies in working. Counsel said his point was that if there are going to be economies, the Committee should know the extent of them, in considering the suggested equal rate over the whole district. All the savings made, remarked Counsel, would benefit the shareholder.

The CHAIRMAN: But after the rate is the same in both districts, all the benefits and economies will inure to the consumers.

Mr. WEDDERBURN: Yes; but we think these benefits should come more rapidly.

Witness said that the Slaithwaite Company would, in all probability, have to increase their price if the amalgamation did not take place. As it was, the Slaithwaite consumer was getting an advantage, and the Longwood consumer was not hurt.

Counsel also put questions suggesting that the standard price should be reduced; his argument being that this is practically a new company with a new area. Witness would not accept this view. It was a similar case to many others where the same process had been adopted. The special circumstances of the Wakefield case were that the Committee on that Bill were told that when the capital was raised the public were informed that the sliding-scale was never intended to be used so far as 6d. of the standard price was concerned. Therefore the Committee decided that there was no good purpose served in keeping the standard price up to the figure then existing. Consequently the price was reduced. It was, however, very seldom done.

Mr. WEDDERBURN: It has been done; but I agree it is recent and rare.

In re-examination, witness said it would be impossible to estimate the economies to be obtained by the amalgamation; but there was little doubt that they would be considerable.

This closed the case for the Bill.

Mr. WEDDERBURN then addressed the Committee for the Golcar Urban District Council, and did not call evidence. The whole of the Bill, he said, was alleged to be in the interest of the consumer; and this was what had to be proved. If the shareholders were to get any advantage, it should be adequately shared by the consumers.

The CHAIRMAN: You do not doubt that eventually there will be an advantage to the consumers—after the six years?

Mr. WEDDERBURN: I think that is so, as far as one can see, because of the advantages of the amalgamation. But my point is that the advantage does not come quickly enough. Continuing, he said a fair solution of the difficulty as to price would be to give the Company the two years in which to maintain the *status quo*, and then bring the two prices together. This was largely a question of principle; and he maintained that the promoters had absolutely failed to make out why this case should be taken out of the general principle. The promoters should have been in the position of giving figures to show to the Committee that the economies were so small that it would not be fair to give one rate; but they could not produce any such figures. The only thing that could take the case out of the general principle was that it would cost more to supply in Slaithwaite than in Longwood. This had not been suggested; and it was clear that the larger area would enable the Company to supply more cheaply than to-day. Given one company and one area, why should the people on different sides of the street pay different rates to the same company? A good example of this was in the water supply of London, where, after the taking over of the Companies who were charging different rates, a uniform rate was instituted. Admitting the principle of one area one rate, why should the application of it be delayed? He saw no reason why it should be delayed. The most the Company could ask was the offer he had made of a two years' pause, and then immediate equalization. The six years' period proposed in the Bill was absolutely arbitrary, and nothing had been said to justify it. The period might just as well have been three years or twelve years. The advantages of administration began at once, for instance; and the larger the economies, the more urgent the need for having the equalization at once.

Mr. RAM said that the economies of administration would not accrue at once, as for two years, until the new works were carried out, the two staffs would have to be maintained.

Mr. WEDDERBURN said he did not agree, as obviously, at once, it would only be necessary to have one manager and one secretary, as the two places were quite close together. In regard to the standard price, he agreed that the reductions in standard price were recent and rare. But it had been done in the cases of Lea Bridge and Wakefield; and the point was why should it not be altered here? It was said that it was unfair to the shareholders, because they had bought on the basis of the existing price. It might as well be said that there should be no alteration in the area, as the capital was raised on the basis of the area. The general practice was to take the price at which the Company could supply and add about 3d. In this case, Longwood was supplying at 2s. 6d. Therefore, the right standard should be 2s. 9d., and not the 3s. 1d. which existed to-day. The difficulty was that the Longwood Company were a sliding-scale Company, and the Slaithwaite Company a maximum price Company. To this extent this was a new Company coming for power for the first time.

The CHAIRMAN, in giving the Committee's decision, said that the Bill might proceed, subject to one alteration—viz., that after two years the price in Slaithwaite should be reduced by 1½d. per 1000 cubic feet instead of 1d.; thus reducing the price to the same as in Longwood in three years instead of five.

WALSALL CORPORATION BILL.

A Thirteen-Candle Power Clause.

This "Omnibus" Bill was last Wednesday before Section B of the Local Legislation Committee of the House of Commons. Part IV. deals with the reduction of the prescribed candle power of gas in the district, and the alteration of the standard burner.

Mr. J. D. FITZGERALD, K.C., Mr. BEVERIDGE, and Mr. TYLDESLEY JONES appeared for the promoters.

Mr. FITZGERALD said that the principal question arising in connection with the Corporation's gas undertaking was that at the present time the illuminating power of gas in the borough was 15 candles; and it was proposed to reduce this to 13 candles, which had already been done in a considerable number of cases. Of recent years the heating power of gas had become of much greater importance than the illuminating power. It was in the interests of the consumers that a greater illuminating power should not be supplied than was absolutely required, because it made the gas dearer; and where the gas supply was in the hands of the local authority, all the profit went back to the consumers. Gas of 13-candle power was quite as high as was required; and wherever flat-flame burners were in use the Corporation proposed—again following precedent—to give gratis to the consumers new burners suitable to the reduced quality of the gas. With these new burners the consumers would get, with 13-candle power gas, a higher illumination than from the 15 candle gas used with the flat-flame burner commonly employed.

Mr. *B. W. Smith*, the Gas Engineer and Manager to the Corporation, said that clause 42 of the Bill proposed, first, to reduce the prescribed candle power of the gas, as mentioned by Counsel; secondly, to substitute for Sugg's "London" argand No. 1 burner the "Metropolitan" argand No. 2, or such other burner as the Board of Trade might think fit in the circumstances; and, thirdly, to substitute modern photometric apparatus for the now obsolete bunsen photometer prescribed by the Gas-Works Clauses Act, 1871. In fact, the modern photometric apparatus had been in use in Walsall for some years, at the instance of the Official Examiner, who had requested the Corporation to have the new apparatus instead of the old; so that this clause only regularized what was already being done. He regarded it as a necessary and proper thing to reduce the candle power of gas supplied in the borough. The whole of the gas was used practically under a calorific value—*i.e.*, it depended entirely upon the heat units of the gas for either incandescent

lighting, gas-engine purposes, cooking, or heating. In the past, he had had to artificially enrich the gas supplied by the Corporation in order to bring it up to the requisite candle power, which was detrimental to the quality. There were a number of factories in Walsall still using flat-flame burners; but it was hoped that they would, in their own interests, instal incandescent burners in the future. The clause was drafted in the common form, with the exception that the candle power was being reduced to 13 instead of 14, which was the usual case. The reduction to 13-candle power had been granted, however; and this clause was taken from the West Bromwich Act of 1913. With reference to clause 43, this stipulated that improved flat-flame gas-burners shall be supplied by the Corporation at any time during the two years from Jan. 1, 1915, and at the latest within a period of three months thereafter.

Mr. PEARCE (a member of the Committee) raised the point as to why the calorific clause was not adopted in this case, instead of the 13-candle power, as was the case in most recent Bills.

Mr. BEVERIDGE said that this was really another method of arriving at the same result.

Mr. PEARCE said the Committee had recently heard that the calorific test was the best.

Mr. BEVERIDGE did not think this view was generally accepted.

Mr. PEARCE asked why there was to be no test of heating power.

Witness said it was thought that it would be far better to keep to the illuminating power test. There were still a number of consumers using flat-flame burners; and they might take exception.

Mr. PEARCE remarked that there was nothing in the Bill which could compel the Corporation to keep the quality of the gas up to the mark as regards the heating power, and suggested that it would be better to have a heating test if this answered the purpose.

Witness said he had no objection to this.

In answer to further questions from Mr. PEARCE, witness said that the open flat-flame burner was not so healthy as the incandescent burner.

Mr. JONATHAN SAMUEL: Do you propose to supply mantles free?

Witness: No.

A suggestion at this point arose, with regard to clause 43, as to whether the Corporation should not supply flat-flame burners within two years from the passing of the Act, instead of two years from Jan. 1, 1915.

Mr. KNIGHT (of the Local Government Board) said that it should be within two years from the time the illuminating power was altered.

This view was adopted; and the clause was finally amended to the effect that the supply of new burners by the Corporation should take place within two years "from the date of the passing of this Act."

Clause 54, which deals with the recovery of electricity charges in the same way as gas-rents can be recovered by the Corporation, was struck out of the Bill by the promoters.

The portion of the Bill giving the Corporation the 13-candle power standard and the new burners was then passed.

DEAL AND WALMER GAS AND ELECTRICITY BILL.

Tuesday, April 28.

This Bill again came before the Select Committee of the House of Commons, presided over by Sir HARRY SAMUEL.

Mr. TYLDESLEY JONES, on behalf of the promoters, the Deal and Walmer Gas Company, said the Company had come to terms with the local authorities with regard to the possession of electricity powers in the district. [The previous proceedings were reported in the "JOURNAL" for April 14, p. 125.] The terms arranged between the various parties were that the Company should not do anything under the electric supply provisions until November of this year, by which time the local authorities had to make up their minds whether or not they were going for powers. If they did, then the Company would stay their hands until their application had been decided; but if they decided not to go for powers, the Company would go ahead with their scheme. This would mean the saving of money all round. If the local authorities secured their powers, the powers of the Company were to cease. The former would then have to pay them, first, the £500 they would have to pay the Syndicate; secondly, two-thirds the costs of the present Bill; and, thirdly, any taxed costs that might be incurred in the way of opposition to the local authorities' Bill. In this connection, he mentioned the case of the Sidmouth Act, where the local authority had the right to purchase, and one of the terms was that they were to pay the costs of the Company's Act. Inasmuch as the present Bill related to other matters besides electricity supply, however, the Company did not ask for the whole of the costs; and after negotiations it was agreed that two-thirds would be reasonable. Therefore, if the local authorities decided that they wanted to undertake electric supply themselves, instead of buying works which might not fit-in with their scheme, they would have to pay the sums mentioned; and all parties were saved the cost of an arbitration to fix what should be paid by the local authorities. He, therefore, submitted a new clause to this effect; and in briefly dealing with it, he stated that if the Company were to be relieved of part of the area, they would prefer to be relieved of the whole—they did not want to supply Walmer if Deal had gone—*i.e.*, both local authorities must buy simultaneously.

The CHAIRMAN said that the matter to be considered was the delay which would be caused by this agreement.

Mr. TYLDESLEY JONES said the delay was only until Dec. 1 of this year. If the electric lighting powers were granted to the Gas Company, the generating station would be erected on the gas lands; and if the local authorities had the powers transferred to them later, they might not want the generating station there, yet they would have to pay for it. Therefore, the slight delay caused by the carrying out of the agreement was probably fully compensated for by the saving of the money which would otherwise be expended.

Mr. SYDNEY MORSE, on behalf of the East Kent Power Company, said the Sidmouth case was quite different from the present one, where there was a purchase of a gas undertaking, which, however, was a going concern. If the Committee's decision was carried out, the Corporation would have the right of undertaking the work themselves; and he submitted that two-thirds of the cost of the Bill might amount to £2000, and in addition there would be parliamentary costs next year if the Corporation came for electricity powers under the agreement, and got absolutely nothing for them. They would have no powers given them by the agreement, but would have a very heavy weight put upon their shoulders.

Mr. TYLDESLEY JONES said the local authorities affected thought these were reasonable terms, and strictly carrying out the Committee's decision. In the Sidmouth case there were electricity powers, and the gas undertaking was purchased as well, and the local authority had to pay the costs of the Act which conferred the electricity powers, though they had to go to Parliament the following year to get these powers. He, therefore, submitted that the clause was most favourable; and that it was saving expense as far as possible to both sides.

The CHAIRMAN said the Committee were of opinion that the clause could be taken in the form in which it had been submitted.

HOUSE OF LORDS.

The following progress has been made with Bills:—

The Skegness Urban District Council Bill was reported with amendments.

The Brentford Gas Bill was read the third time and passed.

The Middlesbrough Corporation Bill was brought from the Commons, read the first time, and referred to the Examiners.

The Inverness Gas and Water Provisional Order Bill was brought from the Commons, read the first time, and deemed to have been read a second time and reported from the Committee.

The Kidsgrove Gas Bill, Leyland Gas and Electricity Bill, and Barnsley Corporation Bill were read a second time and committed.

The British Gas Company (Hull Station) Bill received the Royal Assent.

The Select Committee appointed to consider the Bristol Water Bill and the Chelmsford Gas Bill reported that they had not proceeded with them, all opposition having been withdrawn. The Bills were committed.

The petition of the Great Northern Railway Company against the Skegness Gas Bill has been withdrawn.

The Glasgow Corporation (Water, Tramways, &c.) Bill has been referred to a Select Committee consisting of Lord Ribblesdale (Chairman), Lord Chelmsford, Lord Tennyson, Lord Gorell, and Lord Rotherham; to meet to-morrow, May 6.

HOUSE OF COMMONS.

The Deal and Walmer Gas and Electricity Bill, Market Rasen Water Bill, and Abertillery Water Board Bill were reported with amendments.

The Middlesbrough Corporation Bill and the British Gas Company (Hull Station) Bill were read the third time and passed.

The Brentford Gas Bill was brought from the Lords, read the first time, and referred to the Examiners.

The Whitwell and District Gas Bill was read a second time and committed.

The petitions of the Walsall Rural District Council and the Birmingham Canal Company against the Walsall Corporation Bill have been withdrawn.

Additional Provisions.

The Standing Orders Committee reported that the Standing Orders not complied with in respect of the additional provisions in the Walsall Corporation Bill, the Middlesbrough Corporation Bill, and the South Suburban Gas Bill should be dispensed with, and leave given to the Committees to insert the provisions.

Gas Provisional Order (No. 2) Bill.

This Bill, "to confirm a Provisional Order made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, relating to Balcombe Petrol Gas," was presented in the House of Commons by Mr. Robertson, read the first time, and referred to the Examiners.

Workington Gas Provisional Order.

The Local Government Provisional Orders (No. 6) Confirmation Bill, which includes the above Order, was sent forward for third reading by the Unopposed Bills Committee of the House of Commons last Thursday. The Order authorizes the Workington Urban District Council to purchase additional gas lands, and specifies certain lands upon which the manufacture of gas and residual products must not be carried on.

Gas and Water Provisional Orders (No. 2) Bill.

This Bill, "to confirm certain Provisional Orders made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, relating to Dronfield Gas, North Middlesex Gas, Uxbridge Gas, Flint Gas and Water, and Fisherton Anger and Bemerton Water-Works," was presented by Mr. Robertson in the House of Commons, read the first time, and referred to the Examiners.

Gas Provisional Orders (No. 3) Bill.

This Bill, "to confirm certain Provisional Orders made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, relating to East Kent Gas, Garstang Gas, Harpenden District Gas, St. Ives (Hunts) Gas, and Swansea Gas," was presented by Mr. Robertson in the House of Commons, read the first time, and referred to the Examiners.

LEGAL INTELLIGENCE.

DISCS FOR PENNIES IN PREPAYMENT METERS.

Woman Convicted for Fraudulently Obtaining Gas.

At the Manchester City Police Court on Friday, before the Stipendiary (Mr. Edgar Brierley), Margaret Smith, otherwise Hargreaves, was summoned for (*a*) having on divers dates between Jan. 9, 1914, and April 7, 1914, unlawfully and fraudulently abstracted, consumed, and used 222 cubic feet of gas the property of the Manchester Corporation; and (*b*) for having between the same dates feloniously stolen the same quantity of gas.

Mr. A. F. I. PICKFORD, of the Town Clerk's Department, said the first of the summonses against the defendant was taken out under section 68 of the Gas-Works Clauses Act, 1871, for fraudulently abstracting gas from a prepayment meter which was the property of the Corporation; and the second summons was for larceny by stealing the same amount of gas between Jan. 9 and April 7. It appeared that the defendant was the daughter of the tenant of the property, and also that the practice of putting tin discs into gas-meters had been going on for a considerable time at the house. The practice was first discovered on Dec. 10 last year, when a number of discs were found, and defendant was warned that the offence must cease. Notwithstanding this warning, however, more discs were found on Jan. 7, when another visit was paid to the house, and defendant was again severely cautioned. Two days later three more discs were found in the meter cash-box. These discs were all taken out, and a clear start was made again. The defendant, therefore, had already been warned on three occasions; and the Corporation thereafter intimated and decided that no further warning should be given to her in regard to the improper method whereby she was obtaining gas. The next visit of the inspector was made on April 7; and when he called he was surprised to find no less than fourteen tin discs in the cash-box of the meter. Not all of them had acted; but the meter was 6d. short in the quantity of gas consumed —222 cubic feet having been registered in excess of the amount found in the box. The attention of the defendant was drawn to the shortage, and she admitted that she had herself placed the discs in the box. When asked by the inspector for an explanation of her conduct, she replied: "I was left in the house by myself, and I was without a copper." This might have been perfectly true; but it did not seem a valid reason, because she could have easily procured change in the neighbourhood. He therefore suggested that there was no accidental use of the discs, but that they had been inserted deliberately to defraud the Corporation of their gas. The defendant told the officials that the matter "could easily be put right," when her attention was drawn to this further breach of the Act. In fact, she appeared to treat the matter lightly, and asked the inspector to tell her of what amount the meter was "short." But this official refused to take any payment for the shortage. The discs [produced] had apparently been specially cut for the purpose of obtaining gas in a fraudulent manner.

The STIPENDIARY: Do you suggest that these people might keep a supply of the discs to use in this manner—that they make them themselves?

Mr. PICKFORD: Yes, Sir; they may, as you say, make them themselves for use when required.

The STIPENDIARY: Then this practice of using discs in lieu of pennies must be put a stop to.

Evidence bearing out Mr. Pickford's opening was given by *Robert Hewitt*, a gas-meter inspector employed by the Corporation, who said he had several times warned both the defendant and her father in regard to the irregular practice of using tin discs instead of pennies. When he warned her on one occasion her excuse was that she had "no coppers," that she was left in the house alone and had two babies to look after, and to attend to the shop as well. In these circumstances, she used the discs.

The STIPENDIARY asked defendant whether she had any questions to put to the witness concerning his evidence.

Defendant: I have very little to ask him, excepting the question of whether he thinks I took the gas from the meter fraudulently.

The STIPENDIARY (deliberately): Yes; that is the very thing he does suggest. You are only entitled to have a certain quantity of gas on prepaying a certain amount of money for it. You are not entitled to the gas unless you pay for it beforehand. That is one of the conditions under which you are supplied. The prosecutors suggest that it is a fraud if you abstract the gas by any other way than the contract under which you are supplied. The point is quite clear. Have you anything further to say on the matter?

Defendant: I had two little babies in the house at the time, and I have to look after them. I am left alone in the shop, and my father is often away.

The STIPENDIARY: Then do you suggest that your father leaves you a supply of discs before he goes away?

Defendant: No; he leaves me coppers. But if I have no coppers—I use the coppers in the shop as well for giving change—I use a disc.

The STIPENDIARY: I am afraid that explanation does not satisfy me in the least. Discs appear to have been found on several occasions; but on this particular day no less than fourteen were found. Were all these put in the same day?

Defendant: No, Sir; they were put in one at a time.

The STIPENDIARY: Then you must have kept a stock of discs handy?

Defendant: No; we didn't keep a stock. I cut them out of a tin used for stencil lettering when I had no coppers.

The STIPENDIARY: It is clear that discs must not be made haphazard for this purpose, and it is of no use to bring in the plea that you could not obtain change into coppers because of your babies requiring your attention. You had been warned on three occasions. I do not know whether or not you think this is an appeal to my sentiment, because I do not really believe it at all. Have you any witnesses to call?

Defendant: No; I have no witness except my father.

In giving evidence on behalf of the defendant, her father stated that he told his daughter that she could do no harm in using the discs, because they could be paid for at the time the collector called for the money. He assured her that there was no question of fraud in using the discs in this manner; and, according to the terms of contract made in hiring the meter, he was liable for any money short or abstracted. The hirer of the meter was bound to refund, on the terms of the contract for the hire of the meter, any shortage recorded; and he had done so previously. So he submitted that there was no intention to steal or to defraud.

The STIPENDIARY said he would dismiss the summons for larceny; but on the charge of fraudulently abstracting the gas there would be a fine of 10s. and costs.

Defendant's father said he would appeal against the decision. He emphasized the point that there was no intention on his daughter's part either to steal or defraud.

The STIPENDIARY: You may appeal if you desire to do so. I am not quite sure whether there is leave to appeal under this section of the Act; but certainly exercise it if you wish to.

A little later the father of the defendant asked for the discs to be returned to him; but the Magistrate directed that they should be kept in the custody of the Corporation pending the potential "appeal."

Whittington Gaslight and Coke Company, Limited, v. Chesterfield Gas and Water Board.

The Court of Appeal yesterday had before them this case, in which the plaintiffs appealed from the refusal of Mr. Justice Eve [see "JOURNAL" for Dec. 16, 1913, p. 890] to grant an injunction restraining the defendants from making what they alleged was an encroachment on their area. Without calling upon Counsel for the respondents, the Master of the Rolls said the appeal was hopeless, and must be dismissed.

Explosion in an Electric Street-Box.

In the Bow County Court, on Monday of last week, before his Honour Judge Bray and a Jury, Christopher Goodbody, a bricklaying contractor, sued the Poplar Borough Council for damages for personal injuries. Plaintiff's case was that, as he was walking along Bow Common Lane, the cover of an electric chamber on the pavement blew off through an explosion, knocking him very violently up against a building. He saw blue flame, water, and steam come out. He was attended by doctors for several months for a nervous breakdown, from which he had not yet recovered. Dr. Power, for the defence, said all plaintiff was suffering from was disuse of the muscles. Mr. Ingle, of the Electricity Department of the Council, said fusing was a protective measure. No explosion such as had been described could have occurred, as there was no water in the box. He thought it extremely probable that the spark which always came at the severance of the fuse would get out through the joints of the cover, no matter how tightly they were sealed. This spark would be quite sufficient to explode an accumulation of coal gas; and this would lift a pavement cover. It was impossible to prevent gas getting into the chambers; and it was a source of great trouble to all electricity supply undertakings. The gas companies were always informed of an accumulation of gas when it was discovered. Round this particular box there were a large number of gas-mains. Mr. Beauchamp, of the East Ham Corporation Electricity Department, said the greatest care was exercised to prevent the accumulation of gas and air, without which such an explosion would be impossible. It could have nothing to do with the electricity alone. The question left for the Jury to decide was as to whether the chamber was a nuisance on the highway. They decided it was neither a nuisance nor a danger; and Judge Bray said this entirely disposed of the case so far as the Jury were concerned. If Counsel desired to have any legal arguments as to the matter, they could arrange a day. Otherwise the verdict was for the defendants.

Blackpool Corporation Gas Undertaking.

The Gas Engineer and Manager of the Blackpool Corporation (Mr. William Chew) has presented to the Gas Committee his report for the year ended the 31st of March. He states therein that the general business of the gas undertaking shows a revenue of £105,175; being an increase of £1447 over 1913, in which year there was an increase of £8812 over 1912. During the past twelve months, a reduction took place in the price of gas of 3d. per 1000 cubic feet to Bispham, and 2½d. per 1000 cubic feet to slot users; absorbing £900. Returns from residuals declined £1000; and coal prices advanced £1900; making a total falling off of £3800. The feature of the year was the recovery of this loss on revenue by the working results; and the profits will be about equal to those of the year 1912-13, which were £15,012. The net profits for the year 1913-14 are £15,096, against a revised estimate of £12,217; showing an increase of £2879. The output of gas was 670⅛ million cubic feet, against 644⅛ millions before—an increase of 26 millions. This is only 4 per cent., compared with 9¾ per cent., though many new customers have been added. But Mr. Chew explains that, having now dual facilities laid on new property, they divide their custom, using less gas, and are therefore not so profitable. The outlook does not, in consequence, indicate a large increased demand; and the new outlay on outside plant will necessarily be less remunerative. Mr. Chew adds that the residuals market is in a state of decline; prices falling for all forward business.

Reduction in Price at Boston Spa.—Considerable reductions in the price of gas have been decided upon by the Boston Spa Gas Company. As from April 1 last, the charges will be 4s. 2d. per 1000 cubic feet (instead of 4s. 11d.) for lighting pnrposes, and 3s. 4d. for cooking and power supply.

MISCELLANEOUS NEWS.

EXAMINATIONS IN "GAS SUPPLY."

The City and Guilds of London Question Paper.

In the "JOURNAL" last week, we gave (p. 275) the questions set by Mr. Thomas Glover, of Norwich, the Examiner in the "Gas Engineering" examination held at the City and Guilds of London Institute on the 25th ult. We are now able to give the questions set by Mr. Walter Hole, of Leeds, in the "Gas Supply" examination held last Saturday. As on the previous occasion, the candidates were informed that not more than eight numbered questions were to be attempted in the four hours allowed. The numbers at the ends of the questions are the maximum marks obtainable.

GRADE I.

1. (*a*) What apparatus would you require to make a welded joint on a steel main of 4 inches diameter? State precisely how you would proceed to make such a joint, and its advantages and disadvantages as compared with joints of other types used on high-pressure gas-mains. [32.]

or, (*b*) Discuss the advantages and disadvantages of (1) pig lead, (2) lead wool, (3) rubber rings, (4) Portland cement, as jointing materials for a 6-inch cast-iron main. [32.]

2. What is fig. 1? Why is it used? State exactly how it works. [34.]

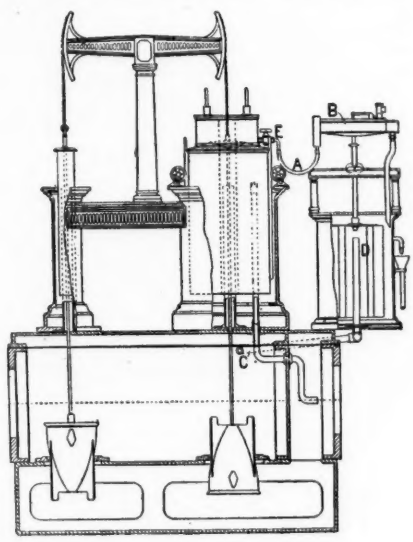


Fig. 1.

3. What is a bye-pass? Sketch any arrangement of bye-pass for a 200-light dry meter, showing all necessary valves. [32.]

4. In selecting that which you consider the best from several different types of slot meters, what constructional points or other considerations would determine your choice? (The question of cost may be neglected.) [42.]

5. State what you consider to have been the most important improvements introduced into the gas-fire in recent years, and explain the bearing of these on the efficiency and economy of the fire. [42.]

6. (*a*) What is meant by the unaccounted-for gas of an undertaking? Of what items is it made up, and what steps would you take in actual work to keep it as low as possible? [32.]

or (*b*) In lighting a workshop where it is essential that the fittings should allow of a certain amount of both vertical and horizontal movement, what type of pendant, suitable for an inverted incandescent burner, would you use? Illustrate your answer by sketch. [32.]

7. What is the principle of the bunsen burner? Sketch a section through one. What is meant by (1) the primary air supply, (2) the secondary air supply? State how many volumes of each are required for the complete combustion of one volume of 15-candle power coal gas. [38.]

8. If on attending to a complaint of shortness of gas supply you obtained a pressure chart on the inlet of the meter similar to that shown in fig. 2, how would you then proceed? [36.]

9. What are the essentials of good street lighting? Discuss the comparative merits of upright and inverted incandescent burners for low-pressure street lighting. [38.]

10. Suppose that a certain floor in a factory, which is separately supplied with gas, is lighted by twenty-four 2-light pendants, arranged down the room in two rows of twelve in each row. Assuming that the pendants are 10 feet apart; that each light consumes 4 cubic feet of gas per hour; that the meter is fixed at the end of the room; and that the service is 30 feet in length from main to meter, what size of (1) service, (2) meter, (3) rising main, (4) pipe, would be required along each row to supply the twelve pendants? Allow a 25 per cent. margin in each case for possible future extensions. [38.]

FINAL EXAMINATION.

1. Assuming that a 20-inch main, lying under a public roadway, had become fractured—the severed ends being thrown considerably out of alignment—and, after an explosion had lifted the surface of the roadway, the gas issuing therefrom had become ignited, how would you deal with it? What particular danger would you have to guard against, at what point in the extinction of the flame would it arise, and what precautions would you take? [36.]

2. A factory using 4000 cubic feet of gas per hour is a mile distant, and at a level of 100 feet below the district from which the supply is taken. The pressure at the inlet of the meter at the times of maximum demand is lowered to 1·8 inches head of water. It is required to increase the pressure on the spot to 2·5 inches. The cost of laying down a new main is considered prohibitive. How would you solve the problem? [32.]

3. You are required to put down in duplicate a self-contained plant, each set of which is to be capable of compressing 10,000 cubic feet of gas per hour to a pressure of 4 lbs. per square inch. What type of compressor would you employ, and why? How would you drive the compressors? Draw an outline sketch showing in plan the arrangement of the plant and connections, the position of all necessary valves, and the size of pipes employed. [34.]

4. Discuss the merits of high-pressure gas-furnaces as compared with blast furnaces supplied with gas at normal pressures. Draw a sectional plan and elevation of a high-pressure gas-furnace capable of dealing with 56 lbs. of brass, showing the arrangement of the burner. What furnace temperature would you require for this purpose, and, assuming three consecutive melts, what time would you expect each melt to take, and at what expenditure of 15-candle power coal gas per pound of metal melted? [38.]

5. You are required to prepare a scheme for heating by means of gas an apartment 30 ft. by 20 ft. by 15 ft. What apparatus would you employ, to what extent, and at what expenditure of 15-candle power coal gas, assuming that the temperature is to be raised from 50° Fahr. to 60° Fahr., and the air in the room is completely renewed three times per hour? Show clearly how you arrive at your conclusions, and upon what data your calculations are based. [38.]

6. Calculate and plot [upon the piece of ruled paper given with the questions] the half lower hemispherical polar curve of a high-pressure gas-lamp, fixed at a height of 20 feet from ground level to the centre of the mantle, which is found to give the following illuminating effect at ground level—viz.,

Immediately beneath the lamp	2·0 foot-candles.
At 20 feet from a vertical line passing through lamp	1·5 ,, ,,
,, 40 ,, ,, ,, ,, ,, ,, ,,	1·0 ,, ,,
,, 50 ,, ,, ,, ,, ,, ,, ,,	0·5 ,, ,,
,, 80 ,, ,, ,, ,, ,, ,, ,,	0·3 ,, ,,

To complete the curve assume that the lamp gives 1400-candle power along the horizontal line passing through the centre of the mantles.

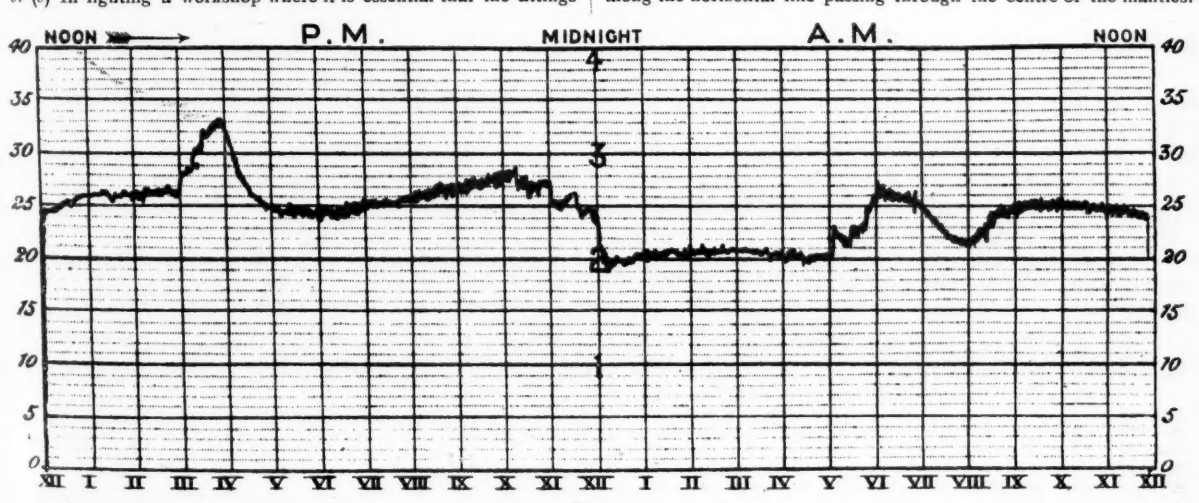


Fig. 2.

The above ground level illuminating effects are presumed to be taken on surfaces perpendicular to the beam. [42.]

7. What is fig. 1? What is it used for? State precisely how it works. [32.]

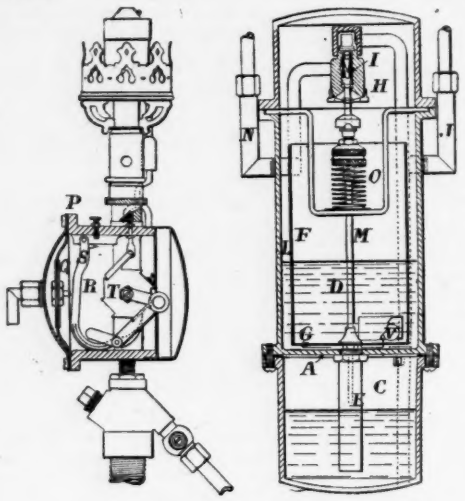


Fig. 1.

8. Fig. 2 shows the ground plan of a lofty market hall which you are required to light with gas. The enclosed squares show the comparative size and position of the stalls. Mark on the plan the positions you would choose for the lights. State the type and candle power of the lamp you would use, the gas consumption per lamp per hour, the height at which you would fix them, and the method you would adopt for lighting and extinguishing. The three entrances marked A are for passenger traffic only, while those marked B are for vehicular traffic. [42.]

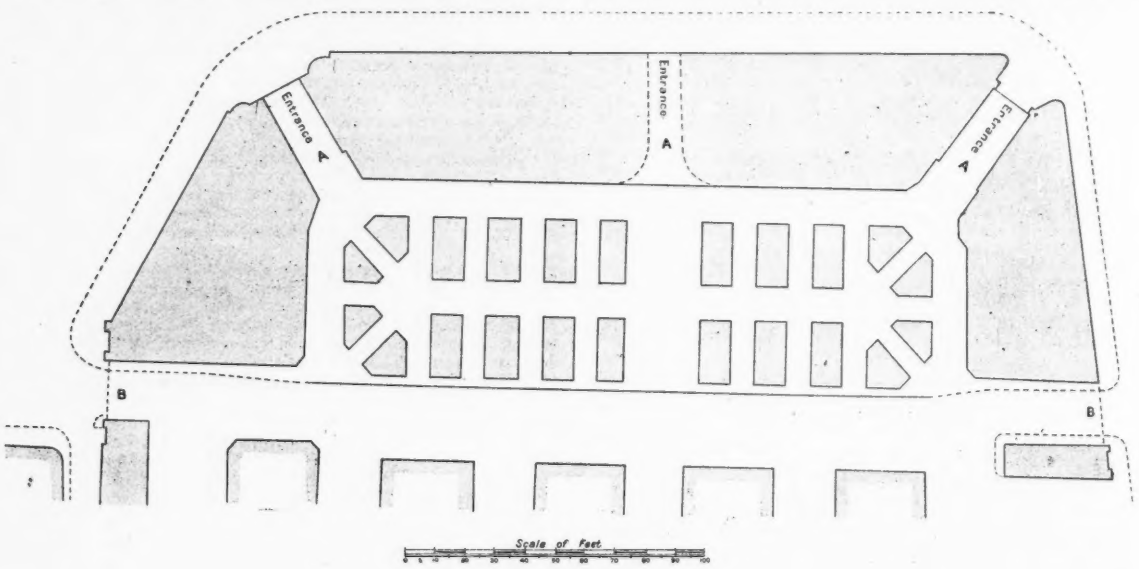


Fig. 2.

9. Discuss the effect of the character of the wall paper and furniture of an apartment upon the lighting effect produced from any given source of illumination. Describe any method or instrument you would use to test this effect. [38.]

10. What mantle temperatures would you expect to find at the bottom, near the top, and at two intermediate equi-distant points of a mantle on a properly adjusted No. 4 "Nico" inverted burner supplied with 15-candle power coal gas? [32.]

Smethwick Municipal Technical School Paper.

The local examination in "Gas Supply" for students attending the classes at the Smethwick Municipal Technical School was held on the 23rd ult.; and the following were the questions set by the teacher, Mr. R. J. Rogers, of Birmingham. In each division, the time allowed was three hours; and six questions only were to be attempted.

Grade I.

1. Describe how you would carry out the operation of fixing a T branch in an existing 8-inch gas-main, (*a*) without stopping the flow of gas through the main, (*b*) by stopping the flow of gas through the main.

2. Describe the construction and working of a five-light wet gas-meter. What means are employed for preventing "slow registration" in wet meters?

3. What are the most common causes of gas leakage on a consumer's premises? What means are adopted for testing and locating such leakages?

4. In fixing a gas-fire, what steps would you take to ensure satisfactory working in the following cases—

(*a*) Where there is a permanent upward pull in the chimney.
(*b*) Where there is a down-draught.
(*c*) Where there is an occasional down-draught?

5. How many candles per cubic foot of gas consumed are obtained from (*a*) a flat-flame burner, (*b*) a low-pressure upright incandescent burner, (*c*) a low-pressure inverted incandescent burner, (*d*) a high-pressure inverted incandescent burner? Explain why a higher efficiency is obtained from a high-pressure gas-burner than from a low-pressure gas-burner.

6. Describe by means of a sketch the operation of fixing a three-light inverted lamp for outside shop lighting; the gas supply-pipe running under the name facia above the shop-window.

7. Explain the function and construction of a geyser. What precautions should be observed in fixing geysers to ensure their satisfactory working?

8. Explain by means of a sketch how you would connect a gas-heated circulator to the existing flow and return pipes from an ordinary kitchen range. What is the efficiency of a gas-heated circulator?

Final Examination.

1. State the principles on which Pole's formula for the discharge of gas from mains is based. Give the formula, and explain its application.

2. A gas undertaking is requested to supply with gas a growing village situated five miles from the gas-works (number of probable consumers 500). The nearest existing main is 4 inches diameter, and is situated 2½ miles from the village. Explain what means you would adopt to supply the consumers, having regard to possible increased consumption in the near future, and state the reasons which govern your decision.

3. Discuss the advantages and disadvantages of wet and dry high-pressure meters. What effect has the increased pressure of gas on the registration of the meter, and what method is adopted to ensure that the correct volume of gas is charged to the consumer?

4. Give a sectional sketch of any 1000-candle power high-pressure lamp with which you are acquainted, and state the reason for the higher efficiency in candle power per cubic foot obtained over that of a 1000-candle power low-pressure lamp.

5. How many B.Th.U. may be obtained from a B.O.T. unit of electricity? How does the efficiency of (*a*) electric radiators, (*b*) electric cookers, compare with modern gas-fires and gas-cookers with electric current at 1d. per unit and gas at 2s. per 1000 cubic feet?

6. A gas-heated circulator consumes 35 cubic feet per hour. What quantity of water may be heated from 55° Fahr. to 120° Fahr. in two hours, assuming the circulator has an efficiency of 84 per cent. and the gas has a calorific value of 520 B.Th.U. per cubic foot?

7. Describe by means of a sketch the method you would adopt for a suspension system of high-pressure lamps over a public thoroughfare 60 feet wide, showing the method of raising and lowering the lamps. What are the principal factors to be taken into account in the consideration of this method of public street illumination? What is the illumination in foot candles obtained directly beneath a 2000-candle power high-pressure lamp fixed 25 feet above the roadway, and what is the illumination on the ground at a distance measured 20 yards from the centre of the lamp?

8. What are the factors governing the construction of a modern hygienic gas-fire? What is the heating efficiency of the fire, and what percentage constitutes radiant heat? How would you ascertain if all the products of the gas were passing away in the flue?

Westminster Technical Institute Questions.

The examination in the Final Grade in "Gas Supply" at the Westminster Technical Institute was held last Tuesday. Messrs. J. G. Clark and D. J. Winslow conduct the classes in this grade. The following are the questions that were put last week. Five of them had to be answered; Nos. 1 and 9 being compulsory. All were of equal value. The time allowed was 2½ hours.

1. There is a decided tendency in modern gas supply to regard the

calorific value as the most accurate index of the utility of gas to the consumer. Why is this? Distinguish between "gross" and "net" calorific values. If a particular gas has a "gross" value of 530 B.Th.U., and yields 22 c.c. of water per cubic foot, what would be the "net" value?

2. What do you understand by—
   (*a*) Thermal efficiency in its relation to
      (*i*) Gas-engines.
      (*ii*) Water-heaters.
   (*b*) Radiant efficiency of gas-fires.
   (*c*) Photometric efficiency of gas-lamps.

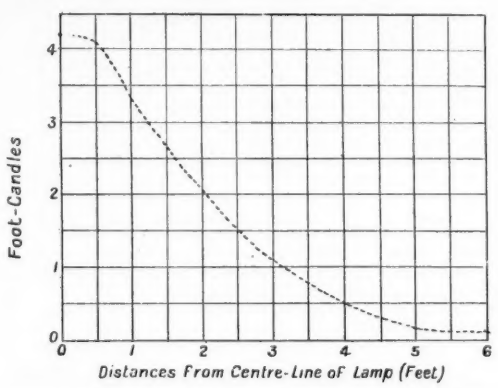
State in each case what you would regard as a fair value.

3. Pole's formula is $V = 1350 \sqrt{\frac{p\ D^5}{s\ l}}$

State exactly what is meant by the various factors in Pole's formula. What is the relation between the flow of gas and its pressure? A gas consumer complains of the cost of lighting some workshops. Upon investigation, it is found that the pressure at the burner is 5 inches. What will be the probable saving in gas if this pressure is reduced by service-governors to 2½ inches.

4. Show by means of rough indicator diagrams the effects of (*a*) premature ignition and (*b*) late ignition upon the power developed in a gas-engine. An engine sometimes fails owing to the exhaust-valve becoming fouled. Why is this? Explain in general terms the method of arriving at the I.H.P. of an engine.

5. Show by polar curves the approximate relation between (*a*) the upright low-pressure burner, (*b*) inverted low-pressure burner, and (*c*) inverted high-pressure lamp. The accompanying diagram shows the illumination due to an office fitting. Plot another curve showing the joint illumination of two such fittings placed 4 feet apart.



6. How would you state the relative values of gas and electricity in regard to cooking and lighting, bearing in mind the most recent improvements?

7. Why is radiant heat regarded as the most hygienic of warming agents? What is meant by the hygienic efficiency of a gas-fire? Describe the "Lancet" test for hygienic efficiency.

8. Describe a method of applying gas for ventilation. It is sometimes stated that excessive heating of air renders it dry. How would you explain this?

9. Sketch as carefully as possible a gas-compressor or a station-governor or a duplex burner, or the various steps in the making of an expanded nipple joint in a steel main.

SHANGHAI GAS COMPANY, LIMITED.

The Annual Meeting of the Company was held in Shanghai on the 2nd ult.—Mr. E. Jenner Hogg presiding.

The Chairman, in addressing the proprietors, reminded them that 1913 was the jubilee of the Company. Looking backward, he said their first Engineer was Mr. W. Dore, who, with a staff of skilled men specially engaged in England, reached Shanghai on Dec. 25, 1863; and the erection of the first gas plant on the present site was begun in March of the following year. All that now remained of this plant was the tank of the first gasholder put down. In 1866, the first year for which the figures were recorded in the report, the total amount of gas sold was 5,318,000 cubic feet; whereas the quantity sold in 1913 was 524,840,000 feet. In the former year there were 185 consumers and 63 public lamps; to-day there were 9020 consumers and 606 public lamps—the extension of the latter having been very restricted in recent years, in consequence of municipal competition. During the fifty years the interests of consumers had been looked after as well as those of the shareholders; and that they had participated in the progress and prosperity of the Company was evidenced by the fact that, while the first rate charged for gas was roughly 23s. per 1000 cubic feet, the figure had been reduced from time to time until now the charge for lighting gas in the International Settlement stood at 2s. 10d. per 1000 cubic feet. They might justly feel pride in the fact that during this period of half-a-century the works had never been shut down, night or day, or the supply of gas to the public suspended. It was disappointing to the Directors that in the jubilee year there should have been some falling off in profits. This condition of affairs, however, had resulted from a recent reduction in price, a revolution, very keen competition, and an adverse exchange. Against these drawbacks had to be recorded a gratifying expansion in the use of gas for cooking, heating, and many other domestic purposes, and also a rise in the receipts for residual products.

30-40 Series.

THE MAIN SPRING.

AFTER Winter departs Cookers alone, of various gas appliances, are in constant daily use in the ordinary household.

Upon the Gas Cookers that you provide for your consumers, therefore, depends the maintenance of your output.

Satisfaction-giving Cookers — "Main" Cookers—form the Main Spring, the force that maintains your sales in the Summer.

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WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12 Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

During 1913, the number of geysers in use increased by 11 per cent., of cookers by 46 per cent., and of fires and radiators 35 per cent. On the subject of electricity, the Chairman said: "In view of the interest lately taken by the members of the community in respect to the Electrical Department, I feel that I may be permittted on this occasion to speak somewhat more fully than is my wont respecting a subject which is of vital importance to us as a Gas Company. The effect of municipal competition on our lighting business cannot be ignored. It is most apparent that many Chinese formerly using gas for lighting have been converted to the use of electricity by means of flat-rates, which work out at a much lower rate per unit than that charged to the foreign community. This does not appear to be an equitable arrangement, and savours of a competition specially aimed at our Company without adequate profit to the ratepayers. But I am afraid that the 'elasticity' already enjoyed by the Electrical Department leads it further afield than is altogether fair; and the extension of that 'elasticity' could only be exercised to the detriment of the business of this Company, which is an important contributor to the rates, as are its individual shareholders. It is obvious that a Company depending on the public for its support and co-operation as ours does, and situated as we are *vis à-vis* a municipal electrical department, with all its facility for the raising of cheap capital, &c., must be seriously affected by such competition. I have in former days claimed from the ratepayers 'a fair field and no favour;' and so long as a municipality confines its trading energies to supplying a legitimately increasing demand, and does not seek to create a demand by unfair competition through pressure of quasi-official canvassing, or by granting facilities and advantages to certain sections of ratepayers, then I say that, if these principles are observed, I feel confident that the gas industry will be well able to hold its own, and will maintain its well-earned position as a good servant to the community, and one they could ill-afford to dispense with." The report was adopted.

THE TREDEGAR GAS-MAINS LOAN.

An Official Explanation.

During March [as recorded on pp. 675 and 743 of the "JOURNAL" for the 10th and 17th of that month], a good deal of surprise was occasioned by a report that the Local Government Board had sanctioned the raising by the Tredegar Urban District Council of a loan for gas-mains on condition that "no payments be made for Mannesmann steel tubes"—surprise which was subsequently mitigated by the explanation that these words were followed in the Board's letter by "out of the amount now sanctioned." Various theories were advanced on the subject of the condition laid down by the Board.

The Council were promised that they should in due time have an official explanation; and this the Clerk has now received. Mr. Noel T. Kershaw (Assistant Secretary) says that he is directed by the Local Government Board to state that their original letter "was not intended to prohibit the use of Mannesmann steel tubes. The Board merely stated that no payment should be made in respect of Mannesmann steel tubes out of the loan sanctioned for thirty years for cast-iron mains, as the period for which the Board would sanction a loan for steel tubes would not exceed fifteen years. This course was taken because it appeared that Mannesmann steel tubes had been provided out of the loan sanctioned on May 11, 1910, for cast-iron mains."

METER-TESTING IN MANCHESTER.

The High-Pressure Gas Question.

At a Special Meeting of the Manchester City Justices last week, the following annual report of the Gas-Meter Testing Department was submitted, approved, and ordered to be circulated. Reference to the question of the testing and stamping of meters for measuring high-pressure gas has already been made in the "JOURNAL," and the remarks of the Official Inspector (Mr. S. Dyson) on this question are interesting.

In submitting his annual report for the period ended March 31, 1914, your Inspector wishes to state that there is still no statutory change in the method of testing meters for measuring high pressure gas. The only test prescribed for all meters by the Sale of Gas Act, 1859, is a test which is inadequate and misleading if applied to high-pressure gas-meters.

The Board of Trade have not as yet issued any general instructions for the guidance of inspectors of gas-meters, in response to the request made by the Manchester Justices Gas-Meter Testing Committee nearly two years ago. The matter is of importance, owing to the increasing use of high-pressure gas both for lighting and industrial purposes; and the London County Council, in its General Powers Bill for 1914, has clauses to enable it to deal satisfactorily with the testing of high-pressure gas-meters. The Corporation of London has included in a Various Powers Bill for 1914 clauses in similar terms to those suggested by the London County Council.

In January last the Edinburgh Magistrates decided to approach the Board of Trade with the object of obtaining parliamentary sanction for a model clause regarding the testing of high-pressure gas-meters to be applicable to all gas-meter testing departments; thus endorsing the attempts made by the Manchester Justices Committee to ensure uniformity throughout the United Kingdom.

The number of meters tested during the year amounted to 43,973; showing an increase of 291 as compared with the previous year. The fees charged (including bank interest, less commission) amounted to £1735 6s. 6d.; being an increase of £38 15s. 3d. The expenditure for

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the same period amounted to £1965 7s. 2d.; showing a debit balance of £230 0s. 8d.

There were 722 meters rejected, or 1·64 per cent. Of the total wet meters tested—viz., 5395—107, or 1·98 per cent., were rejected; and of 38,578 dry meters tested, 615, or 1·59 per cent., were rejected. [Some tables appended to the report showed the cause of error in the meters rejected and the number rejected by the "index test," and gave particulars of meters rejected which have been in use in the Manchester district and removed from the gas consumers' premises for testing.] The number of prepayment or slot meters tested during the year was 27·664, or 62·91 per cent. of the total number of meters tested; the remaining 16,309 being meters of the ordinary type.

For the past twelve years the "index test" has been applied to all Manchester Corporation meters passing through this office. During the past year, 17,736 dry meter indices and 2813 wet meter indices have been tested. The fees received amounted to £478 11s. 3d. Out of a total of 20,549 indices tested during the year, 12 were found incorrect.

BLACKBURN CORPORATION GAS DEPARTMENT.

£10,322 Loss on the Year's Working.

The Gas Committee's annual accounts were presented on Tuesday last to the Corporation. These showed a loss of £10,322 on the year's working, principally caused by the recent strike.

A memorandum signed by Mr. S. R. Ogden, the Gas Engineer, and Mr. J. H. Bailey, the Borough Treasurer, explains how this loss has arisen. It compares with a profit of £10,002 for the previous year, thus showing a total reduction of £20,324. The increase in expenditure is set forth as follows: Coal, oil, &c., £3784; repair and maintenance of works, £3339; distribution of gas, £1290; and strike expenses, £10,003. The total increased expenditure is £14,360, which is reduced to £13,340 by decreases in ordinary wages during the year of £930. The decrease in income has been as follows: Sales of gas, £4282; gas-cookers, £695; residuals, £1768; and sundry small items, £149—making a total reduction of £20,324. It is also mentioned that if the rate of increase of the income from the sale of gas during the first half of the year had been maintained, there would in all probability have been an increase in the receipts of at least £11,000, instead of a reduction of £4367, as the increase in the consumption of gas during that period was over 14 per cent.

The Special Sub-Committee appointed by the Gas Committee to consider the question of the reorganization and reconstruction of the gas-works have appointed as expert Sir Corbet Woodall, who, it is understood, will shortly visit Blackburn, and afterwards present a report. One of the clauses in the recent strike settlement agreement, which was signed by Mr. J. R. Clynes, M.P., and the Mayor, was that the Corporation were to re-organize the works as early as possible.

DUKINFIELD GAS DEPARTMENT.

Working for the Past Year.

The report of the Gas Manager (Mr. William Lindley) on the balance-sheet of the Dukinfield Corporation Gas-Works for the year ended March 31 last shows that the gas-rental amounted to £10,675; a sum of £2227 was received for coke, £801 for tar, and £640 for ammoniacal liquor; and the total receipts were £14,380. The expenditure amounted to £11,374 (£6357 being for coal, £991 for stoking, and £1041 for rents, rates, and taxes); leaving a balance of £3006. By the addition of cottage rents and bank interest, this was brought up to £3081, which was disposed of as follows: Twelve months' annuities, £1077; interest on loans, £955; and sinking fund, £1040—leaving a profit of £9. There was a balance of £5233 on the profit and loss account on March 31, 1913; and the addition of the profit for 1913-14 made a total of £5242.

It is stated by Mr. Lindley that the carbonizing plant worked satisfactorily during the year; the yield of gas per ton of coal being 12,733 cubic feet, compared with 12,173 cubic feet in the preceding twelve months. The sale of gas amounted to 97 million cubic feet (an increase of 5 millions) apportioned as follows: Cottages, by ordinary meters, 42,605,100 cubic feet; ditto slot meters, 17,389,900 cubic feet; mills, 28,872,500 cubic feet; public lamps, 7,092,300 cubic feet; and gas offices, works, &c., 1,473,200 cubic feet. The total make of gas being 106,015,000 cubic feet, there were unaccounted for 8,582,000 cubic feet, or 8·09 per cent. The quantity of coal and cannel carbonized during the year was 8326 tons; and of the 12,733 cubic feet of gas per ton made, 11,702 cubic feet were sold.

IPSWICH CORPORATION WATER SUPPLY.

Opening of a New Pumping-Station.

There has recently been opened by the Mayor of Ipswich (Mr. W. Pipe) a new pumping-station in connection with the water undertaking of the Corporation. It is situated at Whitton, and it will ensure to the town a supply of upwards of 2½ million gallons of water per day, with a possible increase in capacity to 3 millions. The actual cost has been £15,000; and after the parliamentary expenses, together with the outlay for duplicating the machinery, &c., with an 18-inch pumping-main, have been included, the total will not exceed £20,000.

The plant includes a Sulzer-Diesel four-cylinder oil-engine (the only one, we believe, in use for water-works in this country), and a high-lift vertical centrifugal pump, capable of delivering 1850 gallons per minute, or 2,664,000 gallons per day against a head of 164 feet, and 1400 gallons per minute against a head of 216 feet. The engine develops, at 350 revolutions per minute, a normal load of 150 B.H.P.,

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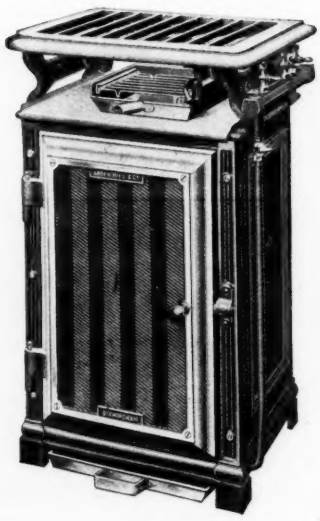

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and a maximum momentary overload of 180 H.P. From the new station the water is conveyed to the reservoirs in Park Road.

At the close of the ceremony, those attending it partook of luncheon served in a marquee on the grounds. The Mayor presided, and was supported by the Chairman of the Water Committee (Mr. Raymond Bennett), the Deputy-Mayor (Mr. E. C. Ransome), Alderman Sir D. Ford Goddard, M.P., and members of the Corporation. In proposing "Success to the New Pumping-Station," the Mayor said they were exceedingly fortunate in having as the Chairman of the Water Committee Mr. Raymond Bennett, who had carried through with conspicuous ability and with great credit to himself and advantage to the town the great work just inaugurated. Associated with him had been the Manager of the water-works, Mr. Oldham; and he paid a special tribute to him for the manner in which he had guided them to the happy issue they had seen that day. Mr. Bennett having responded, Mr. W. Reavell proposed "The Engineering and Building Contractors." Mr. F. Schubeler (of Messrs. Sulzer Bros.) and Mr. P. W. Thompson (of Messrs. Parkington and Son) having acknowledged the toast, the Water Engineer (Mr. C. W. S. Oldham), in response to calls, made a few remarks, in the course of which he said they had really replaced the Water Street works, and the Water Department was able to contribute £2000 towards the rates. He paid a special tribute to his Assistant (Mr. Warner). Sir D. Ford Goddard, in moving a vote of thanks to the Mayor, recalled the early days of the municipalization of the water supply of the borough, and said he had nothing to regret in having had the honour of introducing the question to the Town Council, as the results had far exceeded any anticipations he then made. He submitted his proposal with fear and trembling, as it was felt that they would have to call upon the town for a rate-in-aid for some six or eight years. It was twenty-two years since they obtained the right to work the undertaking; and the results had been wonderful. Though at the beginning there was a rate-in-aid of something more than £2000, owing to prosperous working this had been completely paid off. In addition, the Town Clerk told him that the town had received in aid of the rates no less than £8700 since they acquired the water-works. From what he had seen of it, he thought the new scheme would be a great success. Mr. Oldham had had a very trying undertaking to deal with; but that he had brought it to fruition was matter for congratulation. The Corporation made a wise choice when they appointed him Water Engineer. The Mayor briefly responded.

Rochdale Gas Undertaking.—At a meeting of the Rochdale Town Council on Monday of last week, it was decided to take another £1500 from the gas profits, spread the payments for special works over a term of years, and cut down the estimates of other committees, so that the extra amount to be rated-for was reduced to about £10,000, instead of £14,982. The original estimates showed a prospective increase in the rates of 9d. in the pound; but the pruning which took place at the special meeting enabled a 6d. extra rate to be fixed.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Edinburgh and Leith Corporations' Gas Commissioners have approved of the payment to the British Commercial Gas Association of the full contribution, as suggested by Messrs. Herring and Masterton. The Treasurer, Mr. Canning Williams, reported that the quantity of gas sold during the winter term 1913-4 showed a decrease on that for the corresponding period of 1912-3 of 3,944,600 cubic feet, or 0·56 per cent., which represents in money value a decrease of £593 4s. 2d. There is no doubt that the open winter and freedom from fog are the probable reasons for this small decrease. The increase, however, for the nine months from Whit Sunday, 1913, is 2·35 per cent. The question of the price charged for the public lamps and stair lights in Edinburgh and in Leith has formed the subject of a report to the Works Committee. As regards the latter town, it is pointed out that the lights are paid for by the proprietors individually; whereas in Edinburgh they are charged in the rates. In Leith the lights are only compulsory between September and April, although it is quite probable that the Corporation will in the near future arrange to have the lamps lighted throughout the year, as is done in Edinburgh. It is also pointed out that the Engineer strongly recommends the use of incandescent burners of the "Edinburgh" pattern as far as possible.

The estimates for the Lighting Department of the Corporation of Edinburgh for 1914-15 have been worked out at £44,895. This compares with an estimated figure for 1913-14 of £44,925, and an actual expenditure during 1912-13 of £44,708.

It has been agreed to delay action in the matter of the proposal by the local Special Districts Committee in the matter of acquiring the Pitlochry Gas-Works. It was estimated that the outlay on behalf of the community would be about £7500, and at a meeting of the Committee a letter was read from the Gas Company stating that they were prepared to treat for sale, at a price which would enable the shareholders to receive the par value of their shares in cash, such price to be mutually agreed upon. It was suggested that there would be considerable difficulty, on account of finance, in carrying out the scheme, and that it would be advisable to lay the matter before the ratepayers at a public meeting before proceeding further with the matter.

It may be remembered that the Kinross Town Council have adopted the Burghs Gas Supply Act; and in consequence of a remonstrance signed by over 20 ratepayers having been lodged, a poll has been taken. As a result, only 89 have voted against the purchase; while 229 voted in its favour. The Town Council will now be able to proceed at once with the purchase of the undertaking of the Kinross and Milnathort Gas Company.

The preamble of the Dundee Extension and Gas Draft Provisional Order has been duly proved.

A further reason for the extension of the present gas-works at Kirkcaldy, as against the building of an entirely new works on another site,

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has been brought forward in the application by the Fife Coal Company to be allowed to lay a railway line along the foreshore from a new pit they have opened to the East of the town, so that they may be able to convey the coal to the Municipal Docks for shipment. In view of the fact that these docks are not at present a financial success, costing the townspeople 5d. in the pound on the rates, it would appear that the proposal of the Coal Company was a very good one, as they would put up a sea wall along the foreshore before building the railway. No one who knows Kirkcaldy would be inclined to go there as a health resort. The smells there do not savour of ozone, but of oil from the many linoleum and floorcloth factories for which the "lang toon" is famous. This new factor will probably convince the members of the Town Council, if they are sound business men, that they must give up the idea of being a seaside resort, and content themselves with the growth of the city as an industrial centre. Then they can proceed with the rebuilding and extension of their present gas-works with a clear mind.

The Kirkcudbright Town Council had a curious experience at their last meeting, when they were discussing the introduction of electric light into the town. The gas suddenly failed, whether in protest to the discussion or through malicious interference with the supply is not yet known; but was available after the lapse of only a couple of minutes. The question of the electric light was remitted to the Finance Committee for consideration and report.

The Sanquhar Town Council, having suffered from a large amount of leakage (which was at one time over 30 per cent. on the make, or about 430,000 cubic feet per mile of main), are now to lay a new main from the works to the centre of the town, at a cost of some £340. They are to commence this work at once, as it is thought that the old main in this part of the town is the cause of the excessive leakage. Since the Town Council acquired the works, they have practically remodelled them; and in spite of, or rather in consequence of, the rebuilding of the works and the use of more modern apparatus, they have been enabled to reduce the price of gas by 10d. per 1000 cubic feet. At the same meeting, the Council agreed to raise the salary of Mr. Holland, the Gas Manager, by some 6 per cent.

Tipton Rates and the Gas Undertaking.—When the Tipton Urban District Council had before them a recommendation of the Finance Committee that application be made to the Gas Committee for £600 for the relief of the rates, Mr. Robbins moved that no application be made. He said that for several months during the past year they had an overdraft at the bank of £4000; and if they had any money to give away, it was their duty to give it to the users of gas. Mr. Powell expressed the opinion that the general body of ratepayers should join in the success of the undertaking; while Mr. Calleas pointed out that if they could not rely upon the £600, there would have to be another increase of 2d. in the pound in the rates. Thereupon the Committee's recommendation was agreed to.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 4.

During the past week the market has been very quiet, though there are not many changes in price to report. Pitch is somewhat easier at 37s. 6d. net per ton, and 90 per cent. toluol at about 11d. per gallon naked. Solvent naphtha 90-160 is 10¾d. net and naked. Pyridine is 8s. 3d. to 8s. 6d, net per gallon in buyers' drums. Anthracene, 40-50 per cent., is 2d. per unit net; and creosote in bulk remains at 3¾d. net per gallon.

The position of sulphate of ammonia is quiet, and there is no business to report. Makers have withdrawn as sellers, because of the low prices which dealers propose.

Manchester Tar Prices.

It is officially announced that the average price realized for March deliveries of tar in the Manchester district—based on the value of the products—was 31s. 8d. per ton.

Tar and Tar Products in the Provinces.

May 4.

The average values during the week were: Tar, 25s. 9d. to 29s. 9d. Pitch, east coast, 36s. 6d. to 37s. 3d.; west coast, Manchester, 36s. to 36s. 3d.; Liverpool, 36s. 6d. to 37s.; Clyde, 36s. 3d. to 36s. 6d. Benzol, 90 per cent., naked, North, 10¼d. to 10½d.; 50-90 per cent., naked, North, 10d. to 10½d. Toluol, naked, North, 10½d. to 11d. Crude naphtha, in bulk, North, 4¾d. to 5d. Solvent naphtha, naked, North, 9¼d. to 9½d. f.o.b. Heavy naphtha, naked, North, 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3⅛d. to 3⅜d. Heavy oils, in bulk, 3⅞d. to 4d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 0½d. to 1s. 1d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *May* 2.

With the completion of the covering of contracts for April shipment, the market for this article has become much quieter, and values have declined considerably within the past few days, as there has also been a paucity of new orders from direct buyers. The closing prices are £11 18s. 9d. per ton f.o.b. Hull, £12 per ton f.o b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. It has transpired that some first-hand business has been done for July-December delivery in equal monthly

quantities at a little below £12 at the ports, but buyers generally have not shown much disposition to contract in the forward position.

Nitrate of Soda.

The value of this material has again receded to a small extent, and the quotations on spot are now 10s. per cwt. for ordinary, and 10s. 3d. for refined quality.

From another source it is reported that the market for sulphate of ammonia continues very quiet, and sales are reported at some ports at slightly lower prices. Outside London makes are quoted at £11 5s. to £11 7s. 6d.; Hull, £12 3s. 9d.; Liverpool, £12 5s.; Leith, £12 6s. 3d.; Middlesbrough, £12 3s. 9d.

Renewal of Gas Coal Contracts.

The following remarks appeared in the editorial columns of the "Iron and Coal Trades Review" last Friday: "The time is rapidly approaching when negotiations for the renewal of many contracts for gas coal will be entered into, the bulk of them expiring at the end of June. As a rule, a number of inquiries are in the market by this time; but apparently this year buyers and sellers are each waiting for the other side to make the first move—the terms secured by some of the large corporations and gas companies being anxiously awaited by the smaller concerns, who will then follow the lead given. It will be remembered that, after the six weeks' national strike early in 1912, collieries had no difficulty in obtaining advances of 2s. 6d. per ton for contracts from June. Stocks had been used up, and the state of trade in the country warranted a substantial advance. When negotiations were entered into last year, stocks at gas-works were far below the normal level, and collieries secured a further advance of 1s. per ton. Whether the loss of three weeks' output at pits in Yorkshire will have any material effect on prices remains to be seen; but, generally speaking, works now have reserve stocks on hand, while, with the falling-off in the demand for house coals, collieries will be able to overtake arrears of deliveries on gas coal contracts, some of which are very considerable. At many gas works, in recent years, oil and water-gas plants have been installed; resulting in a large reduction in the quantity of coal carbonized as compared with the gas produced. But, in spite of these, it is expected that many works will be in the market for a largely increased tonnage this year; proving the enormous growth in the use of gas for power, light, heating, and cooking. The competition of gas with house coals fully justifies collieries in securing the best possible terms from gas concerns, and it is understood that they will make great efforts to secure last year's prices for renewals; but buyers may also be expected to put up a bigger fight than usual to obtain reductions, many of them being quite convinced that they will be able to contract on the 1912 basis. The question of the renewal of gas coal contracts, therefore, is a far more interesting one than usual, and will be followed very closely by the commercial section of the coal-mining industry."

COAL TRADE REPORT.

Northern Coal Trade.

There is a good demand for coal generally, but forward prices are a little easier. In steam coals, the exports are now heavier; and for best Northumbrians, the quotation is from 14s. to 14s. 3d. per ton f.o.b. for prompt delivery. Second-class steams are 12s. 6d. per ton; and steam smalls are 7s. to 8s. 3d. For delivery forward, prices are lower, more especially for best steams. In the gas coal trade, the home demand is less, but exports are now being freely made. Best Durham gas coals are quoted from 13s 7½d. to 13s. 10d. per ton f.o.b.; for second-class gas coals about 13s. per ton; while "Wear specials" are 14s., and are somewhat scarce. A few contracts for gas coals for export are in the market; and though buyers wait for further concessions, some sales for Mediterranean ports are believed to have been made, current rates of freight being much below those of the past year. Some home contracts for gas coal are in the market also; and it is probable that when settled the prices will follow those of the great Southern contracts recently decided on. In the coke trade, supplies are not very full. Gas coke is now in lessened output, and the demand for export is good, so that the prices are firm—from 13s. to 13s. 9d. per ton f.o.b. in the Tyne being now quoted for good makes.

Ballarat (Victoria) Gas Company.

In their report for the half year ended Jan. 31 last, which was presented at the meeting on March 12, the Directors stated that the balance at the credit of profit and loss account was £9155. The distribution of a dividend of 5 per cent. and a bonus of 1 per cent. on the paid-up capital of the Company, and the writing of £1000 off plant account, left a sum of £4105 to be carried forward. Mr. W. H. Figgis, who had been in the service of the Company for 53 years, and for the past 34 years had occupied the position of Manager and Secretary, was retiring from office as from the date of the meeting. A minute had been entered in the records of the Company expressing the Board's appreciation of Mr. Figgis's valued and faithful services, and of the untiring zeal and ability with which he had ever discharged the duties of his office. Consequent upon this retirement, the Directors had appointed the Engineer, Mr. S. E. Figgis, General Manager of the Company, and Mr. David W. Davies Secretary. Mr. Davies had been a considerable time in the service of the Company, and of late years had been the Accountant. During the recent visit of the Engineer to Great Britain and Europe, he was brought into contact with some of the leading engineers in the gas industry, and had the opportunity of seeing the latest methods of gas production, lighting, and distribution. The information gained by him was certain to be of considerable value to the Company. Additions were now being made to the plant by the erection of apparatus for the production of sulphate of ammonia.

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Birmingham Gas Profits and the Rates.

The Birmingham Corporation gas accounts for the past financial year have been considered by a meeting of the Gas Committee, and passed subject to audit. In consequence of an increased assessment of the undertaking (involving an addition of some £5000 in the payments under the head of rates), and the higher cost of coal, there is some falling off in the profit on the present occasion, though the higher outgoings have been off-set by the advance of 8½ per cent. in the output of gas as compared with the preceding year. The contribution of the department in relief of the rates for the year just closed will be £70,084, against £77,725 in 1912-13, and £80,681 in 1911-12.

West Ham Public Lighting.

At their meeting last Tuesday evening, the West Ham Town Council considered the recommendation of the Highways Committee to accept the tender of the Gas Light and Coke Company for lighting side streets for a period of five years. There was a long discussion, which, however, resulted in the adoption of the recommendation. The matter had been referred back, so that alternative tenders for two and three years might be obtained. The discussion was started by Mr. Croot, who moved that the tender be accepted for three years. He did not agree with it going over a period of five years, and the Council's Electricity Department being "hung up," so that they could do nothing. Mr. Gawthorn said the difference in the cost of accepting the tender for three years as against five years was the difference between £7600 and £8280. The lamps which the Electricity Department tendered for would necessitate an expenditure of £21,000 for laying new mains; but of this amount only one-fifth was to be charged against street lighting, and the other four-fifths was to be charged against possible private consumers. If the whole of the amount were charged to street lighting, the tender would have to be increased by about 17s. 3d. per lamp. In other words, the difference between the two tenders would have been £2500 a year, or 33 per cent. In the 65 side streets in which the Council had installed electric lighting, there were 18, containing about 1800 rated premises, in which there was not a single private consumer. They had a district in Plaistow where they had the mains laid in nine thoroughfares, which included shops, and they had only three private consumers. Last year they had a slight deficit; and this year they were anticipating a slightly larger one. Alderman White said that if it had not been for the electric light station, the Gas Company would never have made their present offer.

The Board of Trade have submitted to the Waterford Corporation Electric Lighting Committee a draft of the Provisional Order for the electric lighting of the city. It is stated that the objections of those opposed to the site of the station, as well as those of the Gas Company, have been nullified.

Sale of Stocks and Shares.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold by auction, by order of the Directors, £20,000 of 4 per cent. perpetual debenture stock in the Croydon Gas Company; the prices realized being from £88 5s. to £90 per £100 of stock. On the same occasion, they disposed of £410 of additional 3½ per cent. preference "B" stock in the Northfleet and Greenhithe Gas Company, at £70 per £100 of stock; and £500 of new ordinary stock (ranking for a maximum dividend of 7 per cent. and receiving 4 per cent. per annum) in the Great Yarmouth Water-Works Company, the price realized being £90 per £100 of stock. At a local sale, Messrs. Drawbridge and Ansell some days ago disposed of an issue of 150 new ordinary £5 shares in the Burgess Hill and St. John's Common Gas Company. The shares, which rank for a dividend of 7 per cent. per annum, were sold at prices ranging from £5 7s. 6d. to £5 15s. each.

Lighting of a Children's Infirmary.

The Lambeth Board of Guardians last Wednesday received tenders for the provision and installation of electric light wiring and fittings in the children's infirmary, Norwood; and they decided to accept that of the South London Electric Company for £247. The Clerk also reported that the Company had written confirming their offer to supply electricity at the institution at 3d. per unit for lighting purposes and 1d. per unit for power, the prices to remain in operation for five years. Mr. Kinnaird proposed that the matter be referred to the Works Committee, with a view to ascertaining the relative prices of gas and electric lighting; but the Chairman said he could not accept this, in view of the decision in favour of electricity arrived at by the Board at their last meeting. Mr. Kinnaird retorted that they did not decide to instal the electric light. He had obtained certain information about the difference in the cost of lighting by the two systems. The South Metropolitan Gas Company could light the infirmary much more cheaply; and he was prepared to show that the Board would effect a considerable saving by keeping to gas. In a letter submitted at the last meeting, the Gas Company stated they were prepared to place up-to-date fittings in the infirmary for £35. The cost of maintenance of the electric light as against gas had never been discussed by the Board. They were to consider this when they got the tenders in for the wiring. The Chairman ruled that this question was not before them now. They were dealing merely with tenders. They had decided on the general principle of installing electric light. Mr. Kinnaird gave notice that at the next meeting he would propose that the acceptance of the electricity tender be rescinded.

The Directors of the Oriental Gas Company, Limited, have resolved to pay an interim dividend of 3½ per cent., free of income-tax, on account of the year ending June 30 next. The dividend is at the same rate as last year, and will be payable on the 27th inst.

THE "ALL-COPPER-ONE-PIECE."

Spiral-Circulator," with Manhole Closed.

WILSONS'
"SPIRAL-CIRCULATOR"

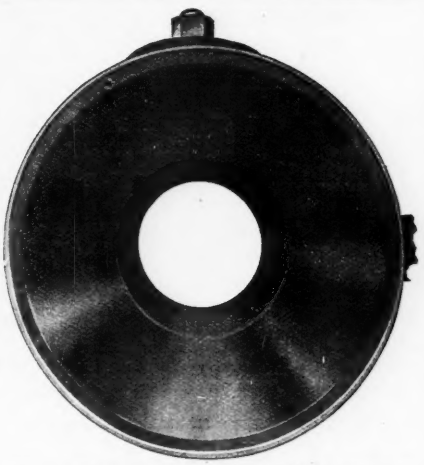
(Patent No. 28996.)

TWO COPPER STAMPINGS made one by BRAZING and forming UNLEAKABLE and INDESTRUCTIBLE Water Chamber. NO RUSTING OF WATER. NO FLOOR SPACE OCCUPIED.

(Prices from £4 4s.)

Internally Heated Throughout.
Products travel 5½ feet in heating chamber surrounded by water.

Cleaned Without Disconnection.
Flue, by lifting out the Spiral. Water Chamber, through the Manhole.


Plan of Inverted Heater looking through flue with Spiral removed.

Spiral which fits into the flue.

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City of Santos Improvements Company.

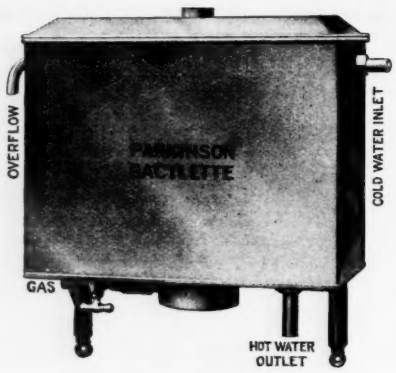
Addressing the shareholders at the thirty-third annual meeting, the Chairman (Mr. D. M. Fox) said the report and accounts for the year 1913 revealed a highly encouraging state of affairs. The undertaking had become a combine of public utility works—comprising the supply of gas and water, a system of electric tramways, and the supply of electricity. The final dividend recommended, of 4 per cent. on the ordinary share capital, would make 7⅛ per cent. for the year, less income-tax. With regard to the gas-works, it was not to be wondered at that the business, as a whole, did not show the expansion of former years, in view of the inevitable competition—or concurrence—of electric lighting. In his opinion, gas had held its own quite as well as could be expected. The Board, however, had under consideration a proposal to extend the area of gas supply—at present limited to the city proper—to the residential quarter on the Barra Beach, thus covering the whole of the city and suburbs. These extensions, it was considered, would largely increase the consumption, especially for cooking and heating purposes. Maintenance of consumers' incandescent burners, cooking-stoves, and hot-water appliances on the monthly subscription system had become increasingly popular during the year, and ensured a highly efficient service. Extensive modifications and additions to the water supply distributing system have been carried out during the year, in order to meet the largely increased demand in the suburbs. The results obtained from the electric light and power undertaking were quite satisfactory; the popular demand for electrical energy having exceeded the expectations of the Directors. It was worthy of mention that, though in two years they had obtained 1124 additional consumers of electricity, they only lost about 50 gas consumers. It was proposed to issue further capital to carry out various works—among them the extension of the gas-mains, and the provision of additional plant of modern type. In concluding his remarks, the Chairman said he had great pleasure in expressing the Board's appreciation of the services rendered by the General Manager (Mr. Bernard F. Browne). It was not too much to state that, to his untiring zeal and unfailing tact, the Company owed, in a great measure, the satisfactory results of the year's working, and especially the excellent relations with the Municipality and people of Santos, who had generously responded to his efforts to merit their confidence. He had been supported by an efficient and loyal staff of officers and workmen.

Heywood Gas Profits and Electricity Losses.—The profit on the past year's working of the Heywood Corporation Gas Department amounts to £543, against £464 last year. The Committee recommend that this be carried to the reserve fund. A year ago the contribution to the relief of the rates was £500. The loss on the Electricity Department is £2840, as compared with £4118 twelve months ago. The Committee ask for a sum equal to a rate of 6d. in the pound towards the extinction of the adverse balance—the same as last year.

Kirkham Council and the Gas-Works Purchase Question.—At the annual meeting of the Kirkham District Council, the Chairman (Mr. H. Dickson, J.P.) referred to the Labour party's programme, which provided for the purchase of the gas-works. He had carefully considered the matter, in conjunction with some of his colleagues, and had come to the conclusion that the purchase of the gas-works was impracticable, and that it would not be a good thing for the district. It would mean the ratepayers having to provide a considerable sum of money.

APPLICATIONS FOR LETTERS PATENT.

9647.—Belliss and Morcom, Ltd., and Pain, A. C., "Air and gas compressors." April 18.
9653.—Parkinson, B. R., "Securing the ends of service-pipes to gas and water mains" April 18.
9655.—Davy, W., "Valve-controlling devices." April 18.
9692.—Harger, J., "Removal, detection, and estimation of carbon monoxide from, and in, gases." April 20.
9738.—Roschanek, O., "Indicating differences of pressure." April 20.
9770.—Parkinson and W. & B. Cowan, Ltd., and Cheshire, W., "Prepayment mechanism." April 20.
9849.—Mellersh-Jackson, W. J., "Distilling coal." A communication from the International Gas Development Company. April 21.
9863.—Rostin, H. P., and Forwood, G. F., "Igniter." April 21.
9875.—Hipp, C. A., "Gas cooking-stove and water-heater." April 21.
9890.—Fennel, J. W., "Burners." April 21.
9922-3.—Toogood, H. J., and R. Dempster and Sons, Ltd., "Gas-retorts." April 22.
10,059.—Mackenzie, J., "Manufacture of sulphate of ammonia and the purification of coal gas." April 23.
10,074.—Stott, V. H., and Schofield, L., "Geyser." April 23.
10,084.—Bonneau, L. C., and Hasenfratz, V. E., "Treatment of spent material from gas-purifiers." April 23.
10,097.—Ciselet, E., and Deguide, C., "Extraction of sulphur from gas" April 23.
10,118.—Toogood, H. J., and R. Dempster and Sons, Ltd., "Air supply of furnaces." April 24.
10,186.—Brondum, M. V., "Gas-valves." April 24.
10,188.—Allen, T. G., "Acetylene generators." April 24.
10,215.—Murray, T. E., and Grady, C. B., "Trapping particles in suspension in gas currents." April 24.
10,277.—Hibberd, C. E., and Goad, F. L., "Gas-meters." April 25.
10,293.—North, J. T., "Pyrometer." April 25.
10,310.—Galtier, R. M. L., "Gas-irons." April 25.



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(STORAGE HEATER)

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Copper throughout, Tinned inside.

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JUST THE THING FOR HAIRDRESSERS.

THE PARKINSON STOVE CO., LTD.
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The Biddulph Gas Undertaking Loan.

A Local Government Board inquiry was held recently by Mr. A. G. Drury, relative to the application of the Biddulph District Council to borrow £10,500 for gas-works purposes. Four members of the Council opposed the scheme on various grounds. It will be remembered that the Council purchased the gas undertaking for £3000; and in addition to this sum, the proposed borrowing powers included £2570 for a new gasholder, purifiers, retort-settings, and other additions to the works; £3870 for new mains, meters, and services; and £1060 for legal and other costs of acquiring the undertaking, the Provisional Order, and the stock-in-trade, and to provide working capital. Mr. J. H. Brearley, Consulting Engineer to the Council, gave detailed particulars of the proposed scheme, which had been prepared by him, and stated that he felt confident that in three years' time the present consumption of 3 million cubic feet per annum could be increased to 9 millions.

West Bromwich Gas Undertaking.—The West Bromwich Gas Committee state that the sales of gas during the financial year ended March 31 amounted to 367,882,167 cubic feet, an increase of 8,498,128 feet as compared with the previous year. The gas-rental was £41,700, an increase of £56.

Mr. R. Gamble Marks, of Southport, has forwarded a sample of a copyright folder which he has had prepared for managers to distribute among their gas consumers. Instructions are given as to the use of the gas-oven, with the aid of the patent uniform heat distributor and the Marks "Bakewell" meat roaster. These appliances are in use in a number of places, including Liverpool, where the Gas Company sell the heat distributors to consumers at 3d. each over their actual cost price, and the roasters at usual trade prices. The folder also contains some useful recipes.

The Parkinson Stove Company, Limited, of Spring Hill, Birmingham, have clothed their new season booklets with artistically designed and coloured wrappers which are well calculated to arouse curiosity as to the contents in those whose eyes may fall upon the covers. And the contents are worth more than a passing glance; for the Company supply water-heaters (with which one of the booklets deals) for all purposes, on behalf of which many claims as to efficiency and construction are advanced. In fact, it is pointed out that every machine embodies the results of over 45 years' manufacturing experience. Various new patterns of apparatus are being introduced by the Company, reference to which was made in the "JOURNAL" a fortnight ago. The second booklet refers to cookers, &c.—a branch in connection with which the name of the firm is equally well known.

GAS COMPANIES IN THE STOCK EXCHANGE.

Last week the Stock Exchange was a material improvement on its predecessor. It was much better than could have been expected, seeing that it was broken by the May Day holiday, and that there was no real advance made towards a settlement of the many knotty questions which are troubling the political and social worlds both at home and abroad. "War" has not been declared, though "a state of hostilities" exists in the Mexican Gulf, and most people persuade themselves that civil war cannot actually become a *fait accompli*. Thus buoyed up, a happier feeling predominated in the House. All the leading departments closed with higher figures; the gain of Consols being $\frac{3}{8}$ in the week. Monday opened with a sentiment of relief at the possibility (to say no more) of arbitration in the Mexican muddle, and speculators for the fall began to set their houses in order. So prices advanced freely; but, as soon as the "bears" had covered, they began to go down again, and the last quotations were below the best. Money movements hit the funds, and Consols were $\frac{1}{8}$ lower. Transatlantics, however, did pretty well. Tuesday started under some depression; the pressure to sell in some markets being strong. But presently the tide turned and flowed upward. Consols closed $\frac{1}{4}$ higher, Rails advanced, the Foreign Market was firm, and American marked some rises. Colonials, however, were not in it. On Wednesday, the tendency was quite cheerful. Home and foreign affairs ceased for a while to distress; and prices were higher all round. Things might have gone even better, if it had not been pay-day in account week, which tended to reduce the volume of business. As it was, Government issues were in great favour, and Consols rose $\frac{1}{4}$. Rails were strong, though not devoid of occasional oscillations, and Transatlantics were firmer. Thursday opened bright and cheerful. Home and foreign affairs were less neuralgic, and easier money loomed ahead. Prices continued on the up-grade, and Consols rose $\frac{1}{8}$. But later there was some realizing in advance of the holiday, and prices melted somewhat, and a failure was announced. Saturday was very quiet—many taking a second day's holiday—and movements were irregular. Consols lost $\frac{1}{4}$, and closed at 75 to 75$\frac{1}{4}$. The Money Market was very strong up to the end of the month, after which the pressure was relaxed. Business in the Gas Market was very quiet. But the tendency was quite firm; and what few changes were made in quotations were all in the upward direction. In Gas Light and Coke issues, the ordinary was very moderately dealt in at firm figures; all transactions being within the range of 101$\frac{3}{4}$ to 102$\frac{1}{4}$. In the secured issues, the maximum realized 78$\frac{3}{4}$ and 79, the preference 97 to 99, and the debenture 74 to 75$\frac{1}{2}$. South Metropolitan had three or four deals at 109$\frac{1}{4}$ to 109$\frac{3}{4}$; and the debenture marked 74 to 75. In Commercials, the 4$\frac{1}{2}$ per cent. fetched 106$\frac{3}{4}$ and 107. Among the Suburban and Provincial group, British made 44$\frac{1}{4}$ to 44$\frac{3}{4}$, Brentford old 262 and 263$\frac{3}{4}$, ditto new 205 and 207, Brighton original 211, and ditto ordinary 157 (a rise of 1 in each), South Suburban 114 to 115$\frac{1}{2}$, and (on the local Exchanges) Newcastle 99$\frac{3}{4}$, Liverpool "A" 212, and ditto "B" 145. In the Continental companies, Imperial marked 170$\frac{3}{4}$ to 172$\frac{1}{4}$, ditto debenture 85 and 85$\frac{1}{2}$, Union 81 and 82, and European 18$\frac{1}{4}$ to 18$\frac{1}{2}$—a rise of $\frac{1}{4}$. Among the undertakings of the remoter world, Buenos Ayres changed hands at 90$\frac{1}{4}$, Oriental at 123, Primitiva at 6 and 6$\frac{1}{4}$, ditto preference at 5 to 5$\frac{1}{8}$, and ditto debenture at 93$\frac{1}{2}$.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 5 per cent. Consols, 75—75$\frac{1}{2}$. Previous week, 74$\frac{1}{2}$—74$\frac{3}{4}$.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	61—66	..	3 15 9
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	73—81	..	4 18 9
280,000	5	April 29	7½	Bombay, Ltd.	5¼—6¾*	..	5 17 8
50,000	10	Feb. 26	16	Bourne-mouth Gas & Water — 10 p.c.	29—30	..	5 6 8
352,500	10	,,	7	Bourne-mouth Gas & Water — B 7 p.c.	14½—15	..	4 13 4
75,000	10	,,	6	Bourne-mouth Gas & Water — Pref. 6 p.c.	13¾—14	..	4 5 9
380,000	Stk.	Feb. 26	14	Brentford Consolidated	260—265	..	5 5 8
330,000	,,	,,	11	Do. New	204—209	..	5 5 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	207—212	+1	5 3 9
244,200	,,	,,	8	Do. A Ord. Stk.	153—158	+1	5 1 3
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	90—92	..	4 7 0
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11
100,000	10	—	—	Cape Town & Dis., Ltd.	1—2	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	2¾—4¾	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	106¼—102½	..	4 12 2
1,518,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2
560,000	,,	,,	5½	Do. 3½ p.c. do.	103½—105½	..	5 1 1
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2
800,000	Stk.	,,	4½	Continental Union, Ltd.	80—83	..	5 8 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	..	5 14 9
492,270	Stk.	—	6	Derby Con. Stk.	123—125	..	4 16 0
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11
1,002,180	10	Jan. 15	10	European, Ltd.	18—18½	+½	5 8 1
16,386,660	Stk.	Feb. 12	4/17/4	Gas — 4 p.c. Ord.	101—103	..	4 14 7
2,600,000	,,	,,	3½	Light and Coke — 3½ p.c. max.	76—79	..	4 8 7
4,062,235	,,	,,	4	Light and Coke — 4 p.c. Con. Pref.	96—99	..	4 0 10
4,674,850	,,	Dec. 11	3	Light and Coke — 3 p.c. Con. Deb.	73½—75½	+½	3 19 6
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 12 4
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16¾*	..	6 11 4
131,000	Stk.	Mar. 12	7⅜	Ilford A and C	151—154	..	4 19 0
65,780	,,	,,	6½	Do. B	115—118	..	5 3 10
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	94—98	..	4 3 4
4,940,000	Stk.	Nov. 13	9	Imperial Continental	170—175	..	5 2 10
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 5
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11
718,100	,,	,,	7	Do. B	143—145	..	4 16 7
806,083	,,	Dec. 30	4	Do. Deb. Stk.	99—101	..	3 19 3
68,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	Dec. 11	6	Malta & Mediterranean	4⅜—4⅞	..	6 3 1
250,000	100	April 1	4½	Met. of Melbourne — 4½ p.c. Deb.	98—100	..	4 10 0
541,920	20	Nov. 27	4	Monte Video, Ltd.	11¾—12¼	..	6 10 8
1,775,892	Stk.	Feb. 26	4½	Newc'tle&G'tesh'd Con.	99½—100	..	4 10 0
529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	83½—84½	..	4 2 10
55,940	10	Feb. 26	7/14,0	North Middlesex 7 p.c.	12½—13½	..	5 14 1
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	120—125	..	6 8 0
60,000	5	Mar. 26	10	Ottoman, Ltd.	7¼—7⅝	..	6 9 0
60,000	50	Feb. 26	13	Portsea, Island B	127—130	..	5 0 0
100,000	50	,,	12	Do. C	118—121	..	4 19 2
249,980	5	April 29	8	Primitiva Ord.	6—6⅛*	..	6 3 1
499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—5¼	..	4 15 8
521,600	100	Dec. 1	4	,, 4 p.c. Deb.	93—95	..	4 4 8
346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
150,000	10	April 8	6	San Paulo — 6 p.c. Pref.	10⅝—11¼	..	5 6 8
125,000	50	Jan. 2	5	San Paulo — 5 p.c. Deb.	48—50	..	5 0 0
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	..	4 9 8
209,984	,,	,,	10	Do. B	222—223	..	4 9 8
528,500	,,	,,	10	Do. C	222—223	..	4 9 8
90,000	10	Oct. 15	7½	South African	10½—11½	..	6 10 5
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	109—111	..	4 18 6
1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	+2	5 6 11
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	..	4 9 3
117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
629,740	Stk.	Nov. 13	5	Southampton Ord.	101—104	..	4 16 2
120,000	Stk.	Feb. 12	7⅜	Tottenham District — A 5 p.c.	135—138	..	5 6 10
543,940	,,	,,	5⅝	Tottenham District — B 3½ p.c.	115—117	..	5 0 5
149,470	,,	Dec. 30	4	Tottenham District — 4 p.c. Deb.	89—91	..	4 7 11
182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—110½	..	4 10 6
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	..	5 7 4
255,636	,,	,,	6⅝	,, B 3½ p.c.	129—134	..	5 2 7
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110—115	..	5 2 0
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
98,000	,,	,,	6⅝	Epsom 5 p.c.	121—126	..	5 5 2
88,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	71—73	..	4 2 2

Prices marked * are "Ex Div."

The store-room, and stock contained in it, at the Smethwick works of Messrs. Evered and Co. were destroyed by fire last Tuesday evening. Shortly after the workmen left, smoke was seen to be issuing from a window. An alarm was promptly raised; and the firemen, assisted by a number of the employees who hurriedly returned, were successful in preventing the flames from spreading to other parts of the works.

The Southport Town Council, in General Purposes Committee last Tuesday, rejected an application of the municipal employees for an all-round advance of 2s. per week, making the minimum wage 28s. A motion that 1s. advance be granted was also defeated. The Council, however, appointed a Sub-Committee to consider the wages question, and to see if there was ground for altering the scale agreed upon two years ago.

While engaged in fitting a new service-pipe in a cottage some days ago, two men in the employ of the Hebden Bridge and Mytholmroyd Gas Board were overcome by gas. The main connection had been plugged; but apparently the plug came out, and the room in which the men were working was soon filled with gas. Fortunately, the men were heard to fall, and help was soon forthcoming. Artificial respiration was resorted to, and they recovered. Meanwhile, a message was sent to the gas-works, and an inspector hurried to the house, and succeeded in plugging the pipe. Then he, too, was overcome; but he was brought out, and recovered under proper treatment.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

SUPERINTENDENT (Gas and Steam Cooking Apparatus Works). No. 5875.
DRAUGHTSMAN. No. 5874.
DRAUGHTSMAN. Gloucester Gas-Works.
REPRESENTATIVE. Vulcan Stove Company, Exeter.

Appointments, &c., Wanted.

LEADBURNER, &c. No. 5862.

Gas-Works Wanted.

"D. G.," c/o Scripps's Advertising Offices, 13, South Molton Street, W.

Plant, &c. (Second Hand), for Sale.

CONDENSERS, SCRUBBERS, PURIFIERS, WASHER, GOVERNOR, GASHOLDERS, &c. Metropolitan Asylums Board. Tenders by May 20.
GASHOLDER, &c. Watford Gas-Works. Tenders by May 12.
RETORT BENCH IRONWORK. Hampton Court Gas Company.

Patent Licence.

ACETYLENE GENERATORS. F. W. Golby, 36, Chancery Lane, W.C.

Meetings.

SOUTH BARRACAS (BUENOS AYRES) GAS COMPANY. No. 1 East India Avenue. May 14. 12.30 o'clock.

Sales of Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. London Mart. May 26.
DORKING GAS COMPANY. London Mart. May 19.
DORKING WATER COMPANY. London Mart. May 19.
FELIXSTOWE AND WALTON GAS COMPANY. London Mart. May 26.
HAYWARD'S HEATH GAS COMPANY, London Mart. May 19.
LIMPSFIELD AND OXTED WATER COMPANY. London Mart. May 26.
SLOUGH GAS COMPANY. By Tender. May 14.
WANDSWORTH, &c., GAS COMPANY. London Mart. May 19.

TENDERS FOR

Coal.

BARROW-IN-FURNESS CORPORATION. Tenders by May 12.
CLONMEL GAS DEPARTMENT. Tenders by May 27.
DENBIGH GAS COMPANY. Tenders by May 26.
LEIGH CORPORATION. Tenders by May 18.
RAMSGATE CORPORATION. Tenders by May 11.
SHREWSBURY GAS COMPANY. Tenders by May 22.

Benzol and Benzolized Creosote.

WALSALL CORPORATION. Tenders by May 18.

Gasholder and Tank.

MARKET HARBOROUGH GAS DEPARTMENT. Tenders by May 22.

General Stores (Vitriol, Lime, Lead Piping, &c.)

LEIGH CORPORATION. Tenders by May 18.

Lamp Columns.

CALCUTTA CORPORATION. Tenders by June 15.

Pipes, &c.

DUNDALK URBAN DISTRICT COUNCIL. Tenders by May 12.
HALIFAX CORPORATION.
LEIGH CORPORATION. Tenders by May 18.

Retort Stack, Stove Floor, Roof, Power Plant, &c.

PENRITH URBAN DISTRICT COUNCIL. Tenders by May 13.

Storage Tank.

DUNDALK URBAN DISTRICT COUNCIL. Tenders by May 12.

Stoking Machine.

PENRITH URBAN DISTRICT COUNCIL. Tenders by May 13.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

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